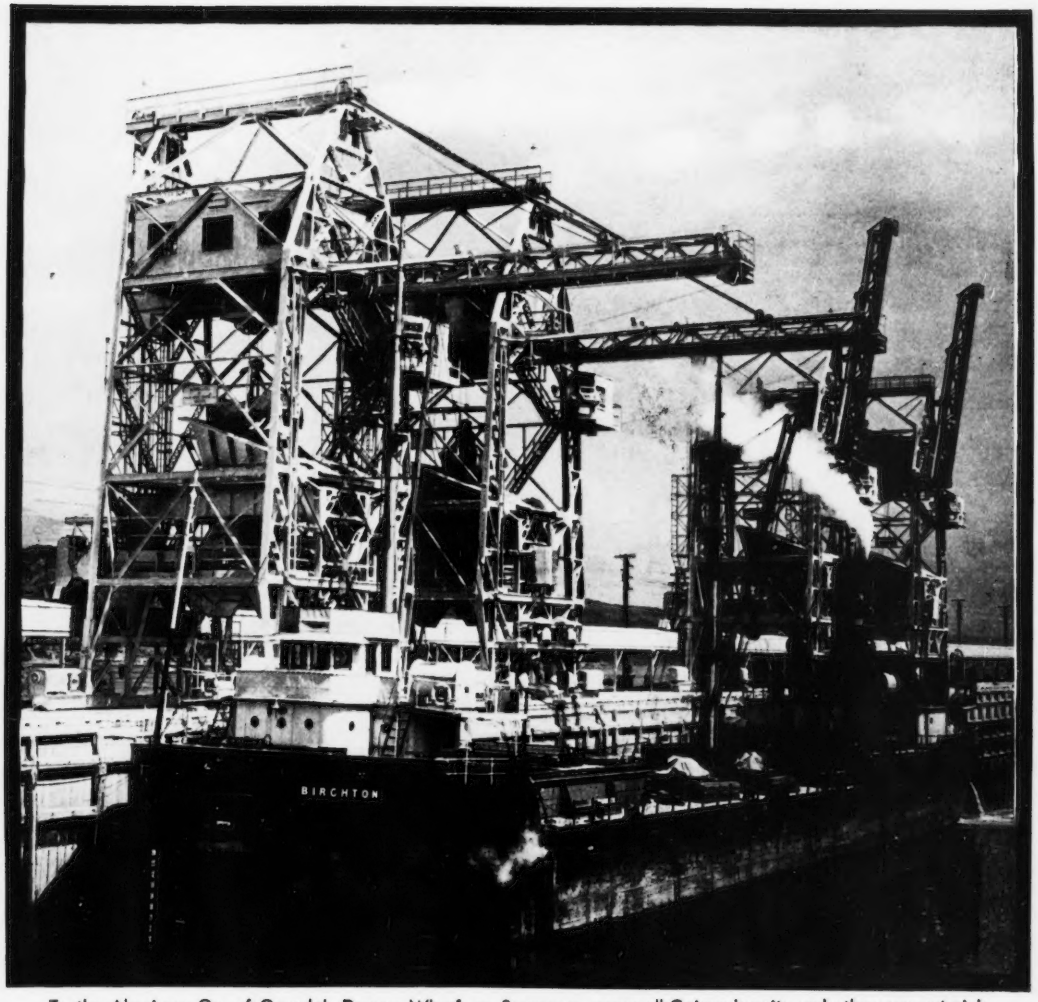
ENGINEERING AND MINING JOURNAL

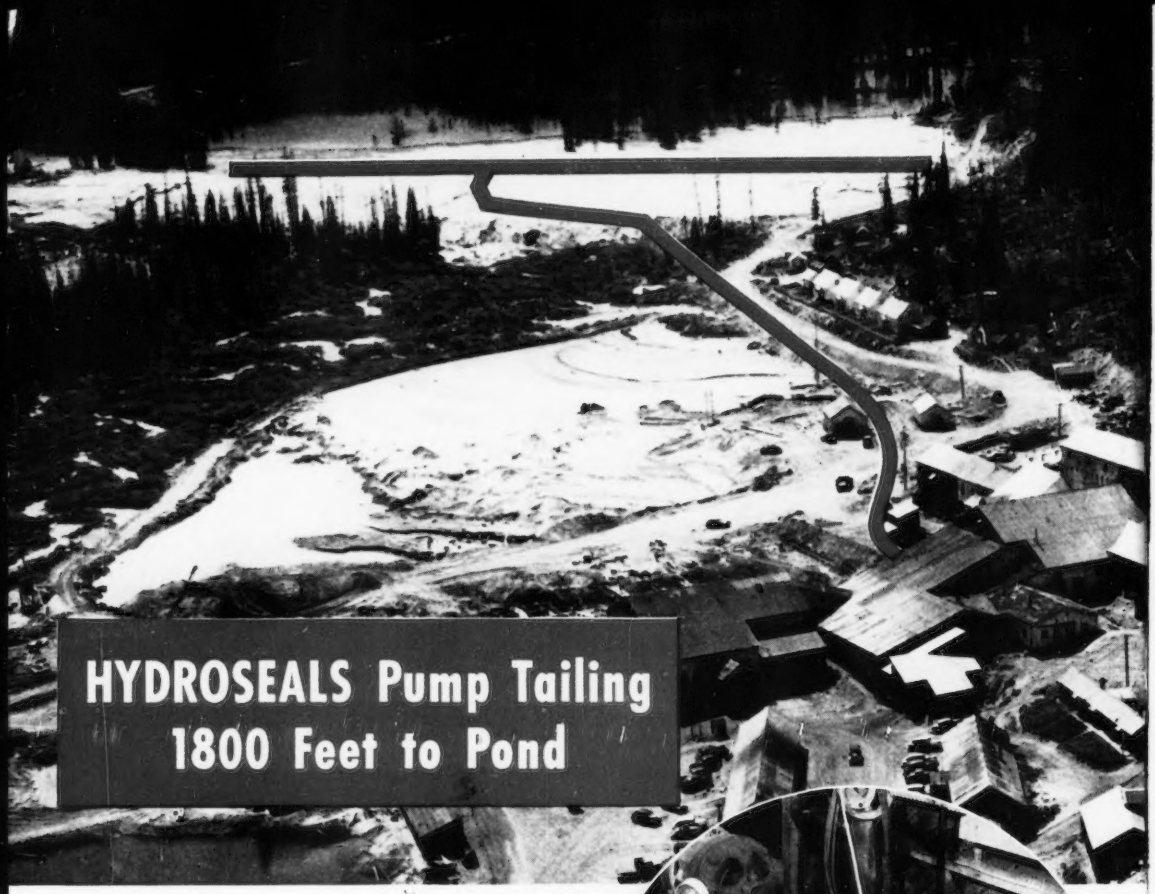
A McGRAW-HILL PUBLICATION

SEPTEMBER, 1949



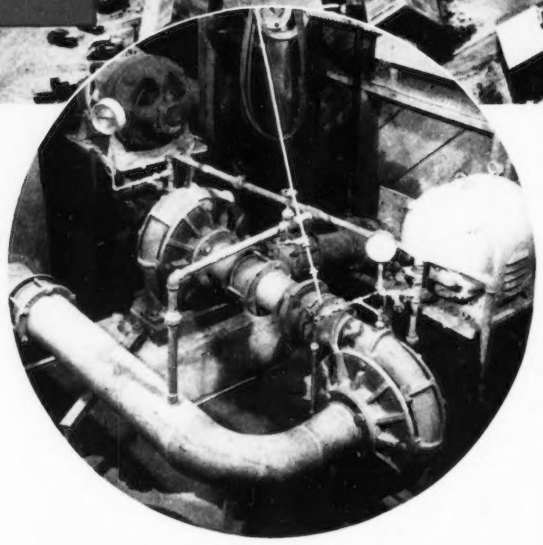
To the Aluminum Co. of Canada's Duncan Wharf, on Saguenay, comes all Guiana bauxite and other raw materials.

Why Stockpiling Isn't Working Out—Page 72



HYDROSEALS Pump Tailing 1800 Feet to Pond

AT the Yellow Pine Mine of the Bradley Mining Co., Stibnite, Idaho, Hydroseal Slurry Pumps have been handling mill tails for several years. The new tailing area, with distribution system as shown in red in the above picture, involves a discharge pipe line 1800 feet long.... Yellow Pine Mine has many other Hydroseals on various jobs both new and as replacements.... These people have saved power and maintenance costs, and you can too, by using Hydroseal Pumps. Write us about your "problem job," also for our catalog. ...*The Allen-Sherman-Hoff Company, 229 S. 15th Street, Philadelphia 2, Pa., U.S.A. Representatives in most Principal Cities.*



Close-up photograph of the Hydroseal Pumps in series, handling tailing at Yellow Pine Mine.

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

NEW 75-POUND STOPEHAMER

makes lighter work of up-hole drilling

DESIGNED WITH CARSET JACKBITS IN MIND

✓ HAS 26% LESS WEIGHT

✓ USES 25% LESS AIR

R-38

Light in weight—
Heavy in performance

Here is the drill that miners have been asking for . . . a rugged, fast-drilling, lightweight Stopehamer designed for use with CARSET JACKBITS . . . a machine built for work in raises and tough pitching stopes where the 26% less weight of the new R-38 means the difference between easy handling and energy-sapping work.

The R-38 is well-balanced, has automatic rotation, a self-cleaning chuck, graduated throttle for easy collaring and a handle which protects the exhaust ports from filling up with grit and dirt when sliding the machine down a stope. When it is used with small CARSET JACKBITS, the drilling speed is high and powder consumption low. The R-38 is also the ideal drill for any far corner of the mine where less air or lower pressures are available. You will want to check the above features as well as the worker appeal of this new Stopehamer—there is an I-R branch office within easy reach of your telephone.

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Gives 2 to 6 times greater impact resistance, troughs better, lasts longer

IN the cord plies of a B.F.Goodrich belt each cord is completely surrounded by rubber — no cross threads tie them together. These parallel cords are completely insulated from one another by rubber, free to "give" lengthwise and crosswise when an impact occurs. Thus the rubber can distort temporarily to distribute and absorb shocks that would damage a stiff, unyielding carcass. This augmented impact cushion means better belt service, longer belt life.

Cord belts trough better — Cord belts carry the load with less belt damage, less material "spill." Even thick, narrow cord belts trough naturally. And because they trough better, cord belts keep centered on the idlers, sustain less damage, require less maintenance. Longer centers, higher lifts can be used. Creasing action between idlers (as in a fabric-type belt) is eliminated.

Cord belts last longer, reduce costs — The better impact cushion of cord construction resists cuts and gouges. A transverse cord "breaker" floated above and across the main cord section helps cushion impact, keeps the cover from stretching beyond elastic limits, and provides better adhesion between cover and carcass. With each cord completely sealed in rubber, this BFG belt resists the effects of acid materials, moisture, mildew.

Cord belts for tough jobs — If your belts must take severe impact on loading or "over the idlers," cutting and gouging at the loading chute, exposure to moisture and acid materials, heavy loads with long centers and high lifts, you need BFG cord belts. Your local distributor will show you how they can save you money. *The B.F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

ENGINEERING AND MINING JOURNAL

FOUNDED 1866

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HOW BASIC REFRACTORIES GOT Bigger Output —With These *Longer* Kilns

MAGNEFER, used in open hearth, bessemer and electric furnaces as "shovel fill" refractory, is produced by Basic Refractories, Maple Grove, Ohio. Magnefer is made by dead-burning dolomite and iron ore flux to a temperature of approximately 3,000° F. in rotary kilns.

Like thousands of other companies, Basic Refractories was faced with the problem of stepping up production to meet a huge demand for their product.

A low-cost solution was found by making use of two existing short kilns at a great saving in first cost. These kilns were joined together and added-to (with a special section), making a 328 ft unit. The second kiln was then engineered and built by Allis-Chalmers to match the first.

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Result? Substantially increased production and a lower cost per ton than was possible with the shorter kilns.

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- Hundreds of successful kilns installed.
- Allis-Chalmers shop and manufacturing facilities are unsurpassed.

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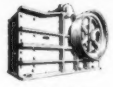
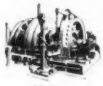
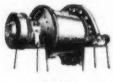
Kilns, Coolers, Dryers



Jaw Crushers



Hoists



Mills

Gyratory Crushers

Vibrating Screens

AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

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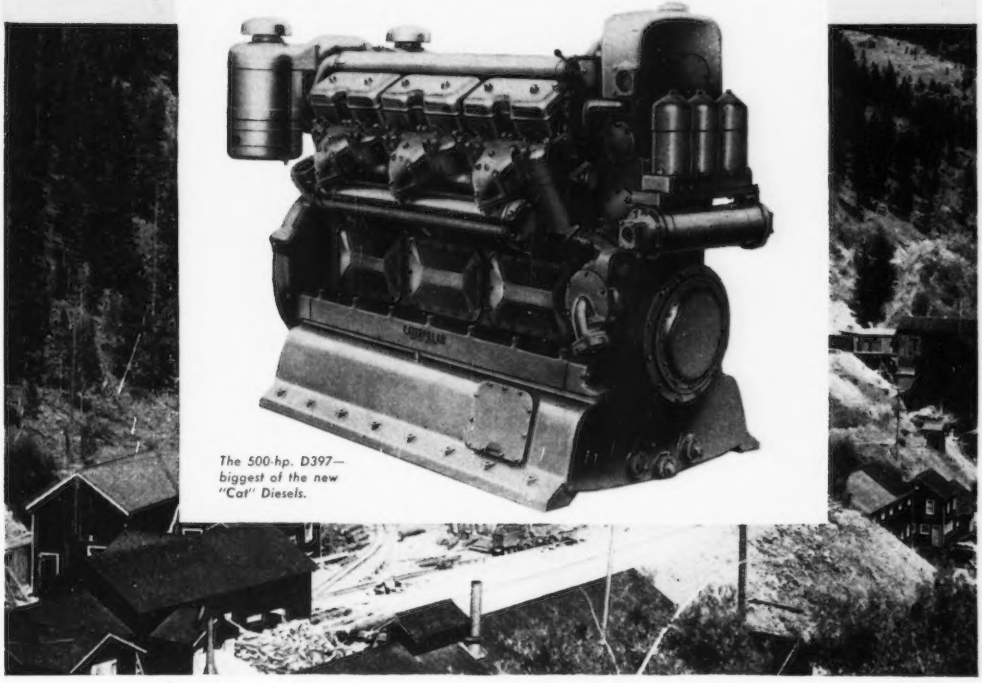
New BIG YELLOW ENGINES BUILT TO HANDLE BIG JOBS



The 500-hp. D397—biggest of the new "Cat" Diesels.

MINING MEN the world over have learned from long experience that they can always depend on "those big yellow 'Caterpillar' Diesel Engines." They've proved themselves in shovels, dredges, draglines, compressors, hoisting machinery, and as Electric Sets.

Now you can power even bigger equipment—with new, bigger "Cat" Diesels. In addition to present models, four great new Engines, ranging up to 500 hp., and four new Electric Sets, generating up to 314 kw., are now coming out of the world's finest, most modern engine factory. Every one is designed to burn low-cost, non-premium fuels—assuring substantial savings. Every one is given a closely supervised dynamometer run to assure proper break-in and full horsepower output.

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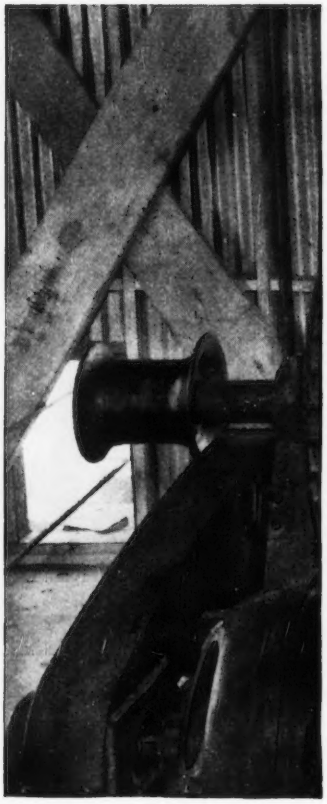

Wire rope and open gears last longer, perform better, when protected by Texaco Crater

To keep wire rope strong longer, lubricate it with *Texaco Crater A*. You'll assure protection for both core and strands. *Texaco Crater A* penetrates quickly and thoroughly, preserving the hemp and guarding the metal against rust, dirt and wear. It is easy to apply and remains soft throughout an exceptionally long life.

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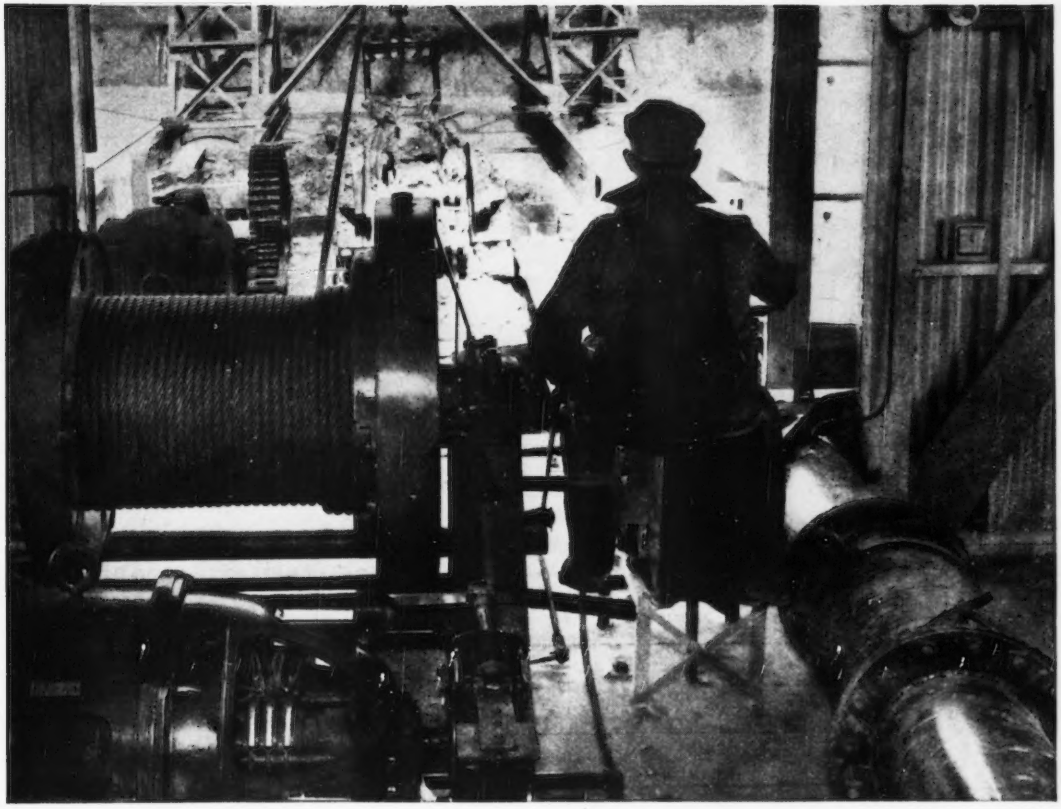
TEXACO

TEXACO



wear and noise.

Mines everywhere are increasing efficiency and reducing costs by using *Texaco Crater* and other Texaco products. In fact –

More copper mining equipment in the U. S. is lubricated with Texaco than with any other brand.

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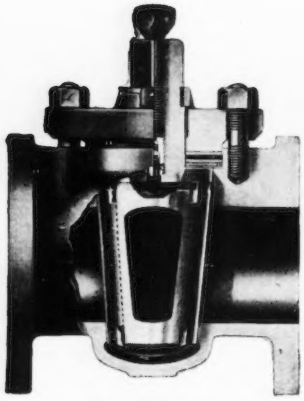
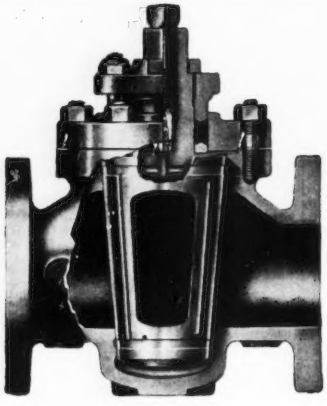
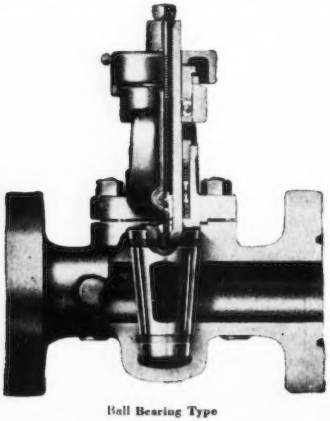
FOR THE MINING INDUSTRY



Single Gland Type



Regular Gland Type



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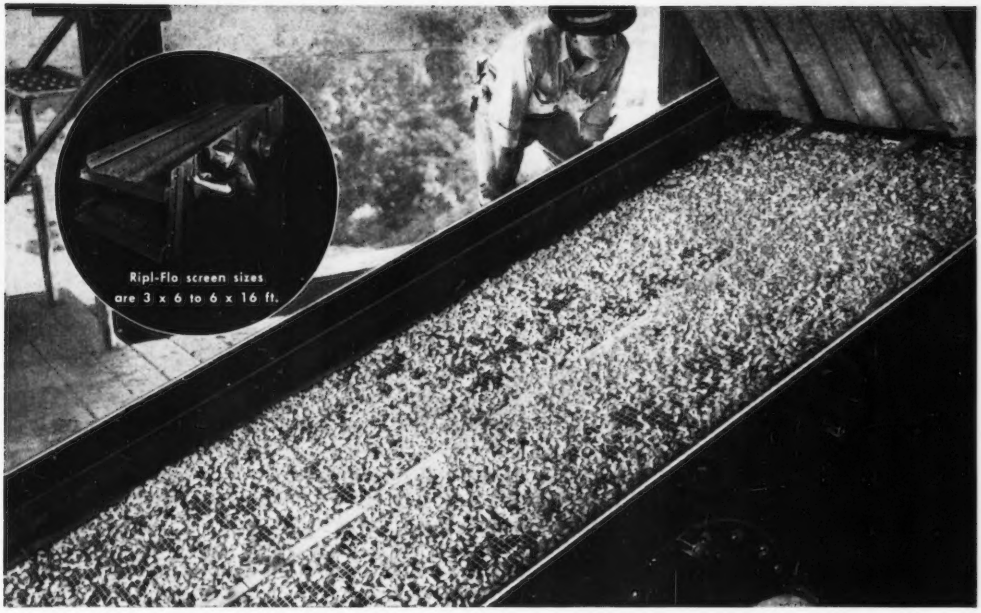

Screens 150–200 TPH, 10 Hours a Day for 7 Years

CAMPBELL LIMESTONE CO., Liberty, S. C. is mighty pleased with this 5 by 14 ft double deck *Ripl-Flo* vibrating screen installed for sizing granite, one of 8 *Ripl-Flo* screens installed here.

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This case is *typical* of how *Ripl-Flo* screens have paid off for hundreds of stone plant operators — in long, dependable service . . . in reduced downtime . . . in *profitable* performance!

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Ripl-Flo's smooth, circular motion to every point on screen surface gives you rapid stratification with no "dead spots" anywhere on screen.

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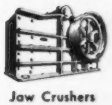
Kilns, Coolers, Dryers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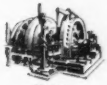
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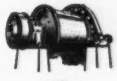
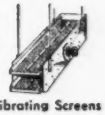

Mills

Gyratory Crushers


Vibrating Screens

AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

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205
Heavy-duty leader in the ½-yard class, Koehring 205 has rugged, dual-purpose boom for both shovel and pull shovel. This saves 20 to 25% over units requiring separate booms. 205 also converts to dragline, clamshell, 7½ to 10-ton crane . . . crawler or rubber tire mount.
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Koehring 605's fast, smooth swing, cool-running clutches, independent boom hoist, make each shift more productive. Big 37" power clutch requires only 1/10th normal lever pull, retains "feel". 605 handles all standard excavator attachments . . . including 30½-ton lift crane.
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For heavy-duty hauling . . .
Koehring 6-yd. Dumpters*, keep excavator output high . . . hauling costs low. They speed shovel swings . . . maneuver in close . . . provide big 8' x 8' target for loading over end or side. No-turn shuttle haul gets them to dump and back fast! 1-second gravity dump eliminates body-hoist maintenance.
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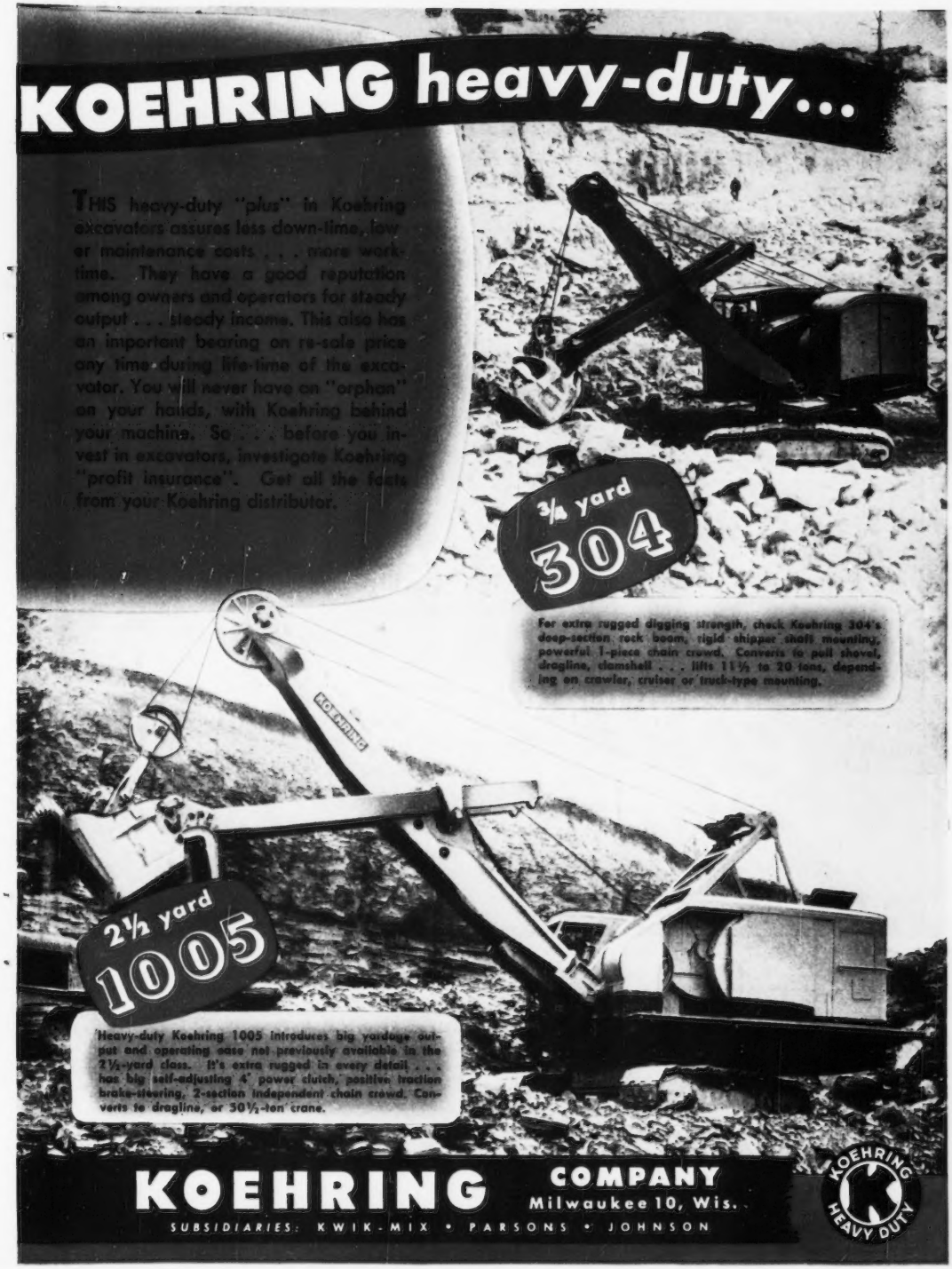
THIS heavy-duty "plus" in Koehring excavators assures less down-time, lower maintenance costs . . . more work-time. They have a good reputation among owners and operators for steady output . . . steady income. This also has an important bearing on re-sale price any time during life-time of the excavator. You will never have an "orphan" on your hands, with Koehring behind your machine. So . . . before you invest in excavators, investigate Koehring "profit insurance". Get all the facts from your Koehring distributor.


¾ yard
304
For extra rugged digging strength, check Koehring 304's deep-section rock boom, rigid shipper shaft mounting, powerful 1-piece chain crowd. Converts to pull shovel, dragline, clamshell . . . lifts 11½ to 20 tons, depending on crawler, cruiser or truck-type mounting.
2½ yard
1005
Heavy-duty Koehring 1005 introduces big yardage output and operating ease not previously available in the 2½-yard class. It's extra rugged in every detail . . . has big self-adjusting 4" power clutch, positive traction brake-steering, 2-section independent chain crowd. Converts to dragline, or 30½-ton crane.

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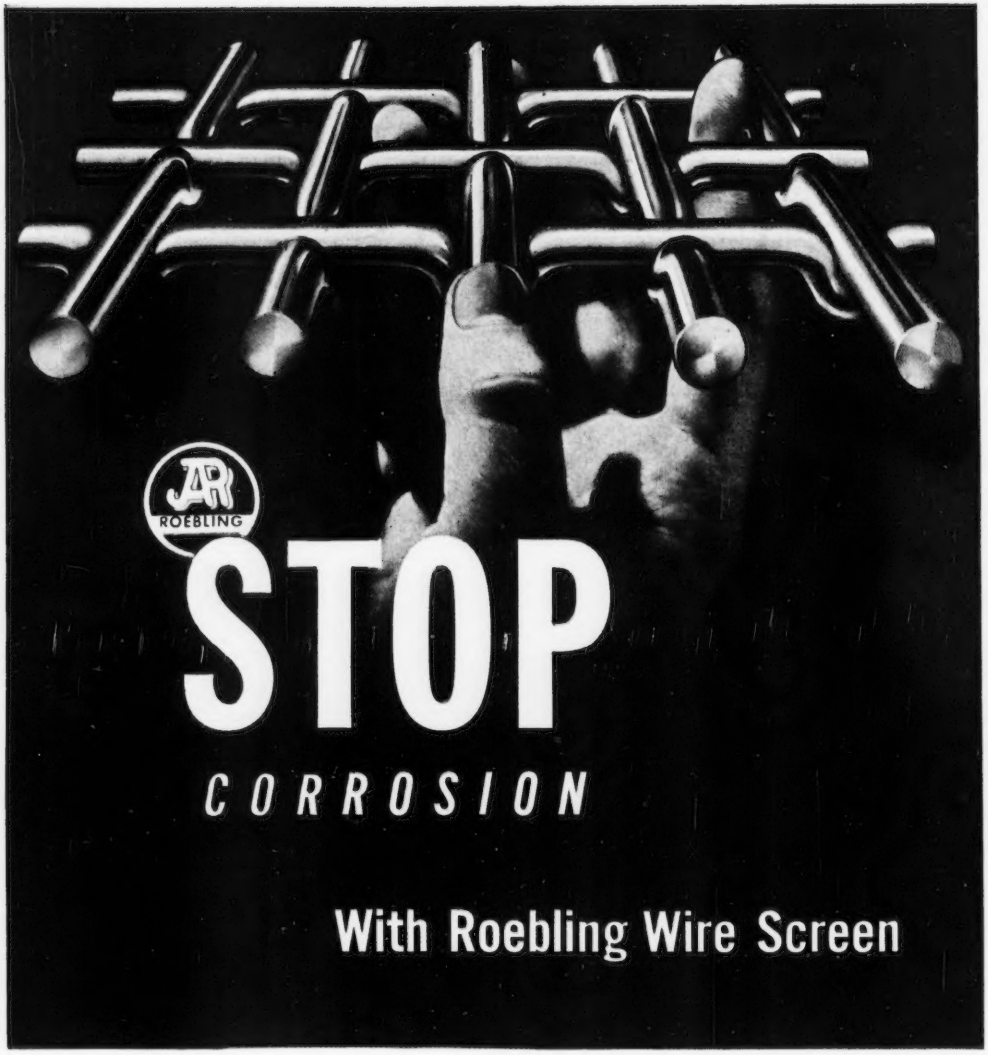
KOEHRING HEAVY DUTY



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WHATEVER YOUR CORROSION PROBLEM, Roebling screens woven of the *right* metal will lick it once and for all. Depending on requirements, various meshes can be furnished in stainless steel, copper, or brass 80-20. Also available are monel, aluminum, and bronze 90-10. There are two new types of Hastelloy, "B" and "C," that are highly resistant to sulphuric and chlorine acids.

Besides the corrosion resistance of the right metal, Roebling Roeflat flat construction gives 75% more wearing surface and sets new records of service life. It causes less blinding and clogging than ordinary screens . . . precision openings help assure uniform grading.

You can have Roebling Roeflat in almost any type of weave, such as Roeton, Roeslot or square mesh with openings of ¾-inch and up. Find out whether you can save screen dollars by using a Roebling screen with the specific corrosion-resistant properties to beat your problems. Write for Catalog W-905. John A. Roebling's Sons Company, Trenton 2, New Jersey.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Rd. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 1635 17th St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. 12th St. ★ *Pittsburgh*, 855 W. North Ave. ★ *Portland, Ore.*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 17th St. ★ *Seattle*, 900 First Ave.

ROEBLING

☆ *A CENTURY OF CONFIDENCE* ☆

What do YOU mine?

NORTHWESTS are digging practically every type of ore from spodumene to gold. These machines are in the heart of the job with many well-known companies. They are in easy digging and tough digging—from the Range to the Pacific Coast.

Northwest Shovels are hard rock Shovels—real Rock Shovels—and if you have a real Rock Shovel you don't have to worry about output in any kind of digging.

Northwests bring you advantages that make them outstanding for performance in the pit. The Northwest Dual Independent Crowd utilizes force *other independent crowd shovels waste*. The Cushion Clutch increases machine life and cable life. The "Feather-Touch" Clutch Control assures ease of operation without valves, pumps or piping. Simplicity of design makes upkeep easy and these are only a few of the many advantages that make the Northwest a money maker in the heart of the job.

Your pit is the *Key Spot* in your operation. Plan to put a Northwest in it. We will be glad to give you details on the size machine you are interested in.

NORTHWEST ENGINEERING COMPANY
1509 Field Building
135 South LaSalle Street
Chicago 3, Illinois

only the best for the heart of the job

MAKE YOUR KEY MACHINE A REAL ROCK SHOVEL

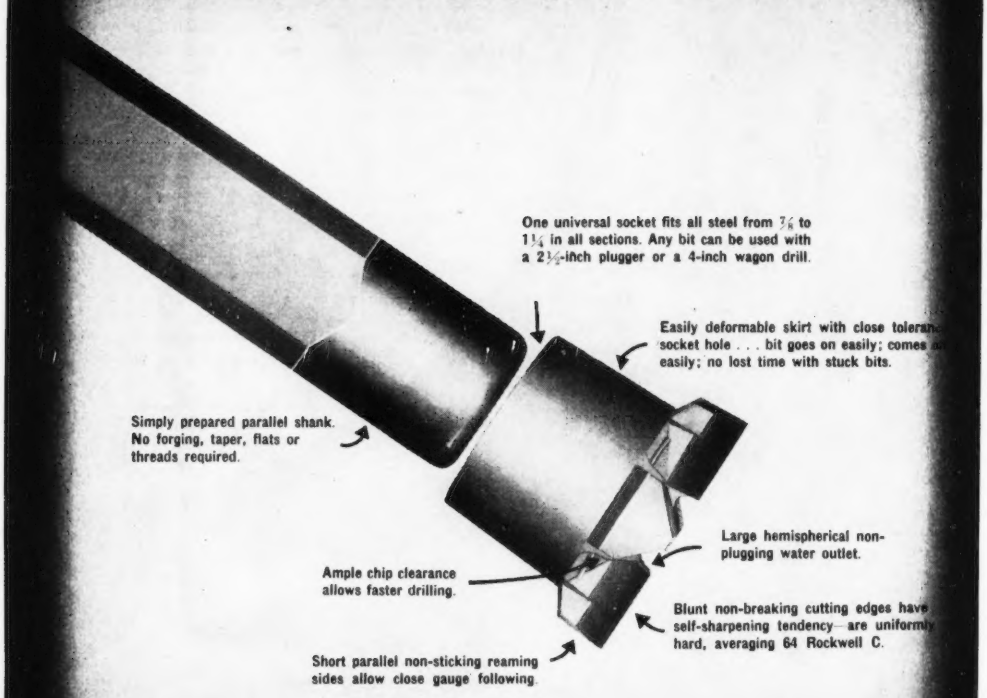
PROFIT

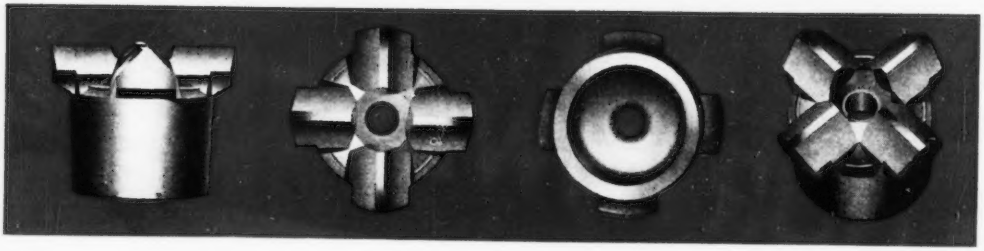
NORTHWEST

Convertible for any Mining, Material Handling or Excavation Problem

THROWAWAY

DETACHABLE ROCK BITS


One universal socket fits all steel from 7/8 to 1 1/4 in all sections. Any bit can be used with a 2 1/2-inch plugger or a 4-inch wagon drill.
Easily deformable skirt with close tolerance socket hole . . . bit goes on easily; comes off easily; no lost time with stuck bits.
Simply prepared parallel shank. No forging, taper, flats or threads required.
Large hemispherical non-plugging water outlet.
Ample chip clearance allows faster drilling.
Blunt non-breaking cutting edges have self-sharpening tendency—are uniformly hard, averaging 64 Rockwell C.
Short parallel non-sticking reaming sides allow close gauge following.



Introducing THROWAWAY BITS

In over two years of use throughout the United States, millions of THROWAWAY Bits have proven and paid for themselves time and time again—have been used consistently by many leading mines, quarries and contractors, of which the following are representative:

Bunker Hill and Sullivan Mining and Concentrating Company

General-Shea-Morrison Hungry Horse Dam, Montana

Sunshine Mining Company

Spokane-Idaho Mining Company

Highland-Surprise Consolidated Mining Company

Coeur d'Alene Mining Company

Multnomah County Rock Quarries

Morrison-Kiewit-Birch Rainbow, Alaska

Following are results of certified tests conducted by a nationally known testing laboratory.

LABORATORY CERTIFICATE

Charlton Laboratories

CHEMISTS — BACTERIOLOGISTS — ENGINEERS

TO: Throwaway Bit Corporation
4200 N.W. Yeon Avenue
Portland 10, Oregon

LABORATORY NO. 23/11

SUBJECT: Performance Tests of 1-3/4 Inch Detachable Rock Bits

DATE: July 22, 1949

On July 13, 1949, T. H. Gray, representing Charlton Laboratories, witnessed a series of performance tests of several commercial rock bits, with the object of determining their relative performance and efficiency. The bits were submitted by Throwaway Bit Corporation and appeared to be new, representative products of manufacturers *No. 1, *No. 2, *No. 3, *No. 4, *No. 5, and Throwaway Bit Corporation. Present at the test were the following:

Ralph Mason – Oregon State Geologist
H. B. Miller – Pacific Chain & Mfg. Co.
W. Deming – Bellingham Chain & Forge Co.
F. C., & J. Crooks – F. L. Crooks & Co.
T. Moore, F. Tremley, R. Deck, B. Karlson & C. Andruss – Baker Machinery Co.
J. Gustafson – Bethlehem Steel Co.
Fred Farrar – Manila Industrial Co.
Ray Andersen – Andersen Machinery Co.
Britt M. Smith – Engineering Clinic

All tests were conducted under identical conditions, employing the latest model Gardner-Denver CF 89-E 5-1/2 inch bore auto-feed drill. Air pressure was 90 to 100 psi. Four-foot drill rods of 1 inch quarter octagon section were used. The test rock drilled consisted of a 3 x 4 x 6 foot block of extremely hard, medium abrasive, granodiorite imported from Nelson Island, B. C. Three-foot holes were drilled under standard conditions and the time required was measured. Additional holes being collared and drilled until the bit ended test showed a lack of continuity of rotation. All bits were completely worn out and in no instance could any bit have been resharpened even once.

The relative performance of each rock bit, found by comparison against the performance of the poorest rock bit, is given in the table below. The performances are rated on the basis of distance drilled and on the speed of drilling. Over-all performance is given as the product of these two ratings divided by one hundred.

Identity of Bit	Distance Drilled in Feet	Drilling Speed, I.P.M.	Hardness after Drilling, Rockwell C	Footage Rating, %	Speed Rating, %	Over-all Performance Rating, %
* Bit #1	3.06	15.4	66-1/2	100	125	125
* Bit #2	4.13	15.0	65-1/4	135	122	165
* Bit #3	4.29	14.5	64-1/2	140	118	165
* Bit #4	4.77	12.3	66-1/2	156	100	156
* Bit #5	7.21	15.9	65-3/4	236	129	304
Throwaway	12.70	14.4	64-1/2	415	150	623

Subscribed and sworn to before me this 22nd day of July 1949

CHARLTON LABORATORIES

David B. Charlton

David B. Charlton

Notary Public for Oregon

** Names available at our office.*

It is the company's policy to avoid grandiose, unsubstantiated claims and to offer results of actual production runs in well known mines, quarries and contracting projects as these become available. Furthermore, the company's metallurgical laboratory, backed by their field men, is constantly endeavoring to give the industry better, faster, further and easier drilling at lower cost per foot.

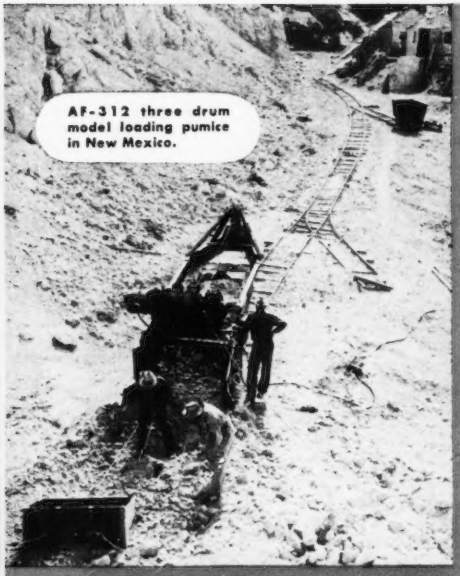
Fully descriptive literature is available and competent field engineers are always at your service.

THROWAWAY BIT CORPORATION

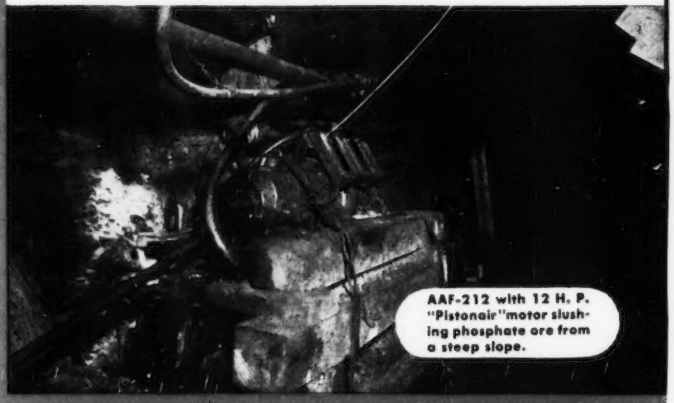
4200 N.W. Yeon Ave. Portland, Oregon, U.S.A.

Throwaway Bits, methods of manufacture, etc., and the name Throwaway are covered by patents already issued, applications for patents, design patents, trademarks, etc. Any infringement will be prosecuted to the full.

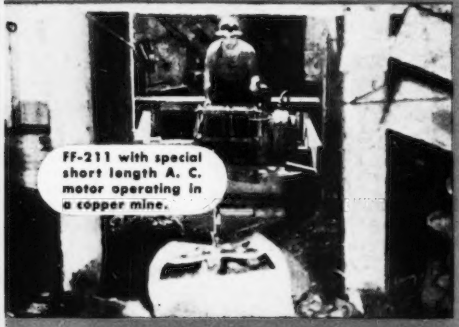
Known and Used



AF-312 three drum model loading pumice in New Mexico.



AAF-212 with 12 H. P. "Pistonair" motor slushing phosphate ore from a steep slope.



FF-211 with special short length A. C. motor operating in a copper mine.

S-211 "Pee-Wee" Slusher with "Turbinair" motor scraping out a small tunnel heading.

BF-212 Electric Slusher scraping hematite ore in an iron mine.

. . . JOY Sheave with safety hook and quick-opening "snatch block" construction.

WRITE for BULLETINS on JOY EQUIPMENT

the World Over-

JOY SLUSHERS

used and preferred for metal and hard-rock work . . .

because

- **They are designed for this specific service**
- **They are built to stand hard wear and usage**
- **Available in a variety of models and sizes to suit every need**
- **Air or electric drive**
- **Portable and heavy-duty**
- **Single or multiple drums**
- **Automatic or remote control**
- **Long Life**
- **Low Maintenance**

Consult a Joy Engineer

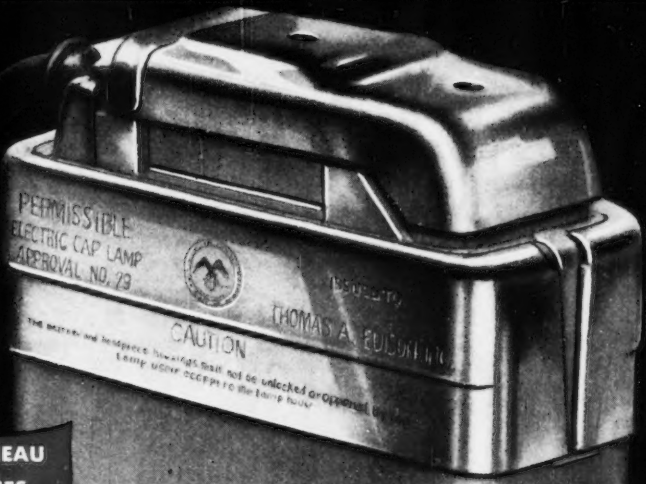
W & D M 2020

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

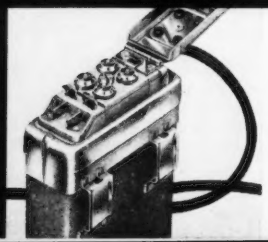
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

new

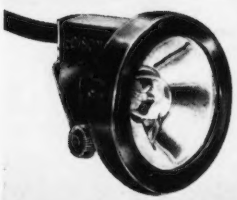


U. S. BUREAU OF MINES APPROVED

25%



The tough nylon plastic battery case is exceptionally resistant to abrasion, denting and impact. All exposed parts are of stainless steel.



Comfortably balanced headpiece contains an efficient gas-filled bulb with two filaments of equal candle power. New bezel locking device permits quick removal and reassembly of the reflector, bulb or rubber-cushioned lens.

brilliance for even greater mining efficiency

with the new EDISON ELECTRIC CAP LAMP model R-4

New from headpiece to battery case, the brilliant Edison Model R-4 gives better light for the miner on every job . . . gives at least 25% more light than other miner's cap lamps. With its increased candle power, the Model R-4 gives a new brilliance that means greater safety for miners and improved mining efficiency—an achievement worthy of the great name, Edison.

Another Edison first in mine lighting is the new focusing headpiece. The brilliant, unfailing, dependable light can be focused to an intense "spot," or a floodlight provided as the job requires.

HEADLINE FEATURES

- ***Positive "Spot"* Adjustment**
- ***Floodlight* When Required**
- ***Comfortably Balanced* Headpiece**
- ***Four-Cell Edison* Nickel-Iron-Alkaline Battery**
- ***Welded Steel* Cell Containers**
- ***Tough Nylon Plastic* Outer Case**

Demonstrations and detailed facts? Gladly, upon request.

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

MSA SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES CO. OF CANADA LIMITED · Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N.S.

MINE SAFETY APPLIANCES CO. (S.A.) (PTY.) LTD. · Johannesburg, South Africa; N'Dola, No. Rhodesia; Bulawayo, So. Rhodesia

Representatives in Principal Cities in Mexico, Central and South America · CABLE ADDRESS: "MINSAF" PITTSBURGH

You Hear It At The Face And In The Front Office

"ROCKMASTER "16" is the greatest improvement in blasting methods since ATLAS introduced milli-second blasting!"

IN UNDERGROUND WORKINGS, pits, quarries, and construction jobs you hear a lot of enthusiastic talk from men and management about the advantages of the ROCKMASTER "16" Blasting System.

For example, blasting men at the face talk about better breakage, savings in dynamite, better control of throw, quicker return to the face. And mining men talk about a safer roof—the result of the lack of vibration typical of ROCKMASTER "16" shooting. When this talk finds its way to the front office, it is quickly translated into greater safety for workers, less expensive handling and milling of rock, less degradation of coal, better rock-production at less cost.

Blasters everywhere—underground and on the surface—find that ROCKMASTER "16" helps them produce more material per pound of explosive. *Sixteen* periods—a wide choice of short or long milli-second delays—add up to better control over throw, back-break, and material size. And underground, *sixteen* delay periods firing in 550 milli-seconds mean less dust and a quicker return to the face . . . less strain on timbers and roof.

Ask your Atlas representative for the new ROCKMASTER booklet explaining how ROCKMASTER "16" fits into your operations.

ROCKMASTER "16" TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES *"Everything for Blasting"*

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Super-tough

for rough stuff

PIT and quarry truck operators will find it pays to BUY and SPECIFY Goodyear's Hard Rock Lug for their rigs. This extra-husky, extra-tough off-the-road tire is specially designed for premium performance on rock and other tire-punishing jobs.

Every feature of this outstanding work tire is job-tailored to give you longer tire life—lower cost-per-mile. The lug bars are massive to armor the tread and sidewall against cuts and rips—the undertread is extra-thick, extra-tough to protect the carcass against bruising—the tread design is universal, self-cleaning, to provide equal pulling power forward or reverse.

Try the super-tough Hard Rock Lug on your roughest runs. Find out for yourself why, *year after year, more tons are hauled on Goodyear tires than on any other kind.*

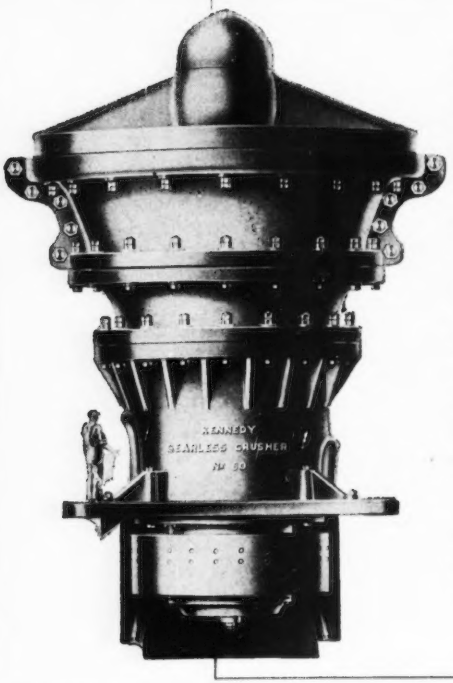
HARD ROCK RIB

Companion tire for front wheels in pit and quarry work—easier steering, smooth rolling, same cord body, same shoulder and sidewall protection as Hard Rock Lug.

GOODYEAR

truck tires

Answer the KVS QUIZ and get



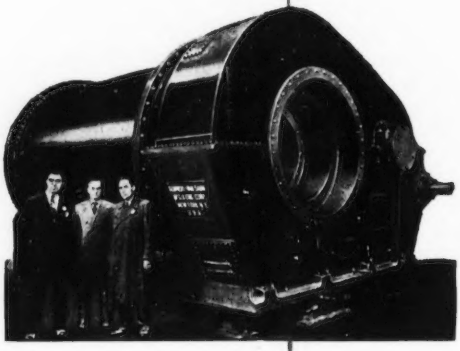
How does the "KVS" Gearless use KINETIC ENERGY to get FREE added crushing power?

Very Simple! Maybe you recall how Mr. Corliss put a big pulley on his engine. The pulley whirled around, created KINETIC energy, added power to the steam engine. That's the way you get ADDED POWER IN A "KVS" CRUSHER FOR NO ADDED COST when the big pulley in KVS Gearless Crushers whirls at a speed of 3,500 ft. per minute. And think! — the 8-ton pulley (used in a KVS Crusher weighing 400,000 lbs.) whirls so easily you can turn it WITH TWO FINGERS! If there were a bevel gear between the eccentric and the pulley, it would take SIX MEN with crowbars to turn it. In short, more CRUSHING for LESS POWER COST, is the idea that puts KVS way out in front, and keeps it there!

How does an OIL BATH save power (and dollars) in "KVS" Ball and Tube Mills?

No trick answer, folks! It's just that the "KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. The bearing never wears out, uses little power. All gears and bearings are automatically sprayed with oil before tube mill is started (Design patented). Believe it or not, in 15 years no "KVS" gears or pinions have worn out on this type mill.

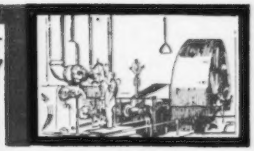
What's more, the Kennedy INTEGRAL GEAR DRIVE enables motor to be DIRECT CONNECTED to driving shaft of this KVS Ball or Tube Mill. Shaft is carried in roller bearings that CANNOT be misaligned or set wrong. Another sure safeguard against wasted power. The pinion shaft to which the motor is connected runs at approximately 600 r.p.m. while other pinion shafts run at about 180 r.p.m. On a 10 ft. mill this enables you to purchase the synchronous motor at a saving of about $6,000.



NO WONDER USERS SAY—"KVS PRODUCTS ARE

MORE CRUSHING

WITHOUT SPENDING MORE FOR POWER



SPEAKING OF CRUSHING . . . .

LOCATION: NATIONALLY KNOWN MINING CO. NEW YORK STATE

CRUSHERS: FOUR NO. 37½ KENNEDY TYPE "S" ROLLER BEARING GYRATORY CRUSHERS

FEED OPENING: 6¼"; **DIAMETER OF HEAD:** 3 FEET

DISCHARGE SETTING: 7/32" CLOSED SIDE AT HEAD

CAPACITY EACH CRUSHER: 56 TONS PER HOUR

HORSEPOWER EACH CRUSHER: 48 HP.

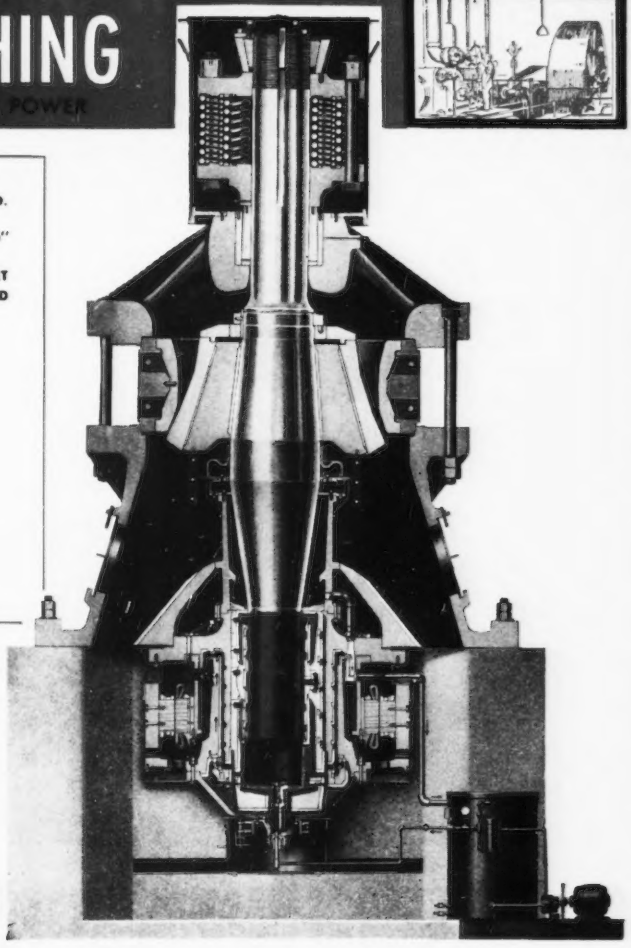
CLOSED CIRCUIT OPERATION

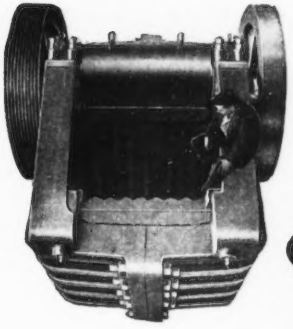
GRADATION AS FOLLOWS:

THE FIGURES!

99.8%	Minus	3	MESH
93.3	"	4	"
80.6	"	6	"
66.6	"	8	"
56.1	"	10	"
48.1	"	14	"
40.6	"	20	"

Can You Equal These Figures?





"KVS" SWING JAW

Write

For this "KVS" Bulletin. It gives complete technical data on "KVS" CRUSHERS—the facts you want before you invest good money.

What's the secret of BETTER Crushing on the "KVS" Swing Jaw?

Answer—the angle of both swing jaw and stationary jaw is the same. Stationary jaw carries fully 50 percent of load—result, you need LESS POWER to keep the swing jaw swinging and crushing. The swing jaw is all one piece, except renewable crushing plate. Also swing and stationary jaws are interchangeable, both the same length, and reversible end-for-and giving two wears.

Kennedy-Van Saun

MANUFACTURING AND ENGINEERING CORPORATION

2 PARK AVE., NEW YORK 16, N. Y.

FACTORIES:

DANVILLE, PA., U.S.A.

CANADA, ENGLAND, FRANCE, AUSTRALIA

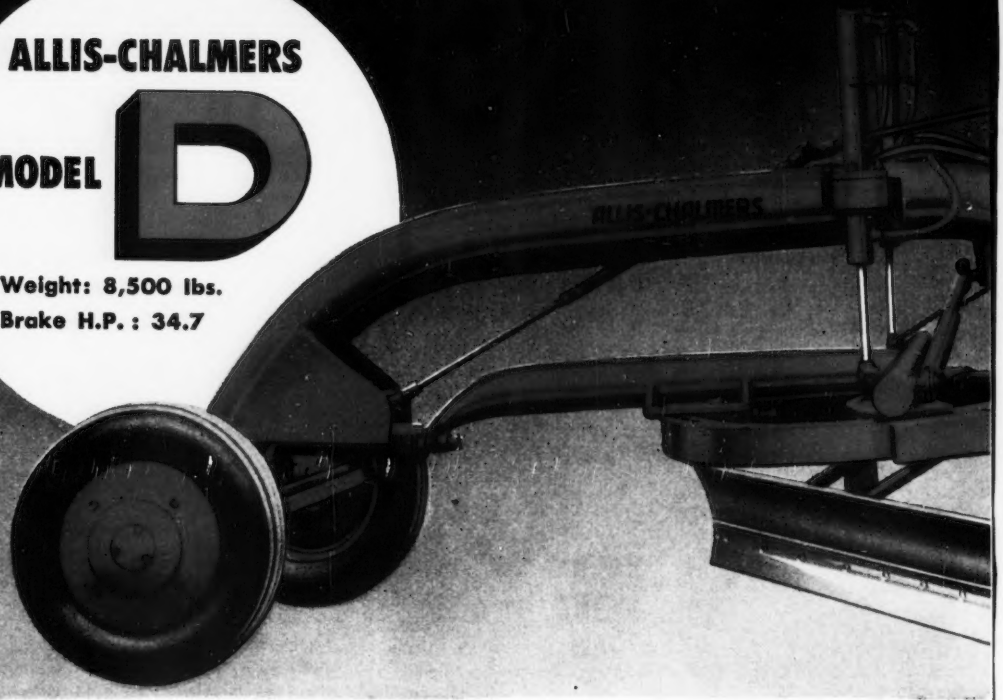
THE PRODUCTS WITH THE TROUBLES LEFT OUT"

Announcing·· A COMPLETELY NEW

ALLIS-CHALMERS

MODEL D

Weight: 8,500 lbs.
Brake H.P. : 34.7



Engineered from the ground up —to bring you BIG grader design and performance advantages

Big in Performance

- **TANDEM DRIVE** — maximum traction at all times, smoother riding.
- **PROPER WEIGHT DISTRIBUTION** — handles bigger loads . . . front-end stability.
- **"ROLL-AWAY" MOLDBOARD**—less power required to move more material at faster speeds.
- **HIGH THROAT CLEARANCE** — rolls larger loads without interference.
- **RIGHT WORKING SPEEDS** — four forward, 2.40 to 18.61 M.P.H.; reverse, 2.37 M.P.H.
- **TUBULAR FRAME AND DRAWBAR** — strong, shock absorbing, better visibility, more working clearance.

Big in Economy

- **RUGGED POWER** — famous Allis-Chalmers gasoline tractor engine; easy to service, economical to operate — fuel tank holds day's supply.
- **SIMPLIFIED SERVICING** — operating adjustments easily reached, quickly made.
- **ALL-WELD CONSTRUCTION** — strong, long life, stands up under tough service.

ALLIS-CHALMERS

TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

LOW-COST MOTOR GRADER

Big in Operating Ease

- **FULL VISIBILITY** — no obstructions, operator can see full blade while sitting or standing.
- **GREATER OPERATOR COMFORT**—roomy platform, comfortable seat, easy to handle.
- **HYDRAULIC BLADE LIFT** — fast, positive, trouble-free; only two control levers.
- **HANDY CONTROLS** — blade angle set from platform; throttle, shift lever, starter, conveniently located next to seat.

Upper half of cab quickly lifted off or replaced.

Scarifier location provides extra down pressure and allows controlled steering.

Watch for **D-DAY** At Your Allis-Chalmers Dealer

SPECIAL ATTACHMENTS

- Hydraulically Controlled Scarifier
- Hydraulic Loader
- All-View Cab
- Snowplow
- Various Other Accessories

Only KUE-KEN*

GYRATORIES *Crush Without Rubbing*

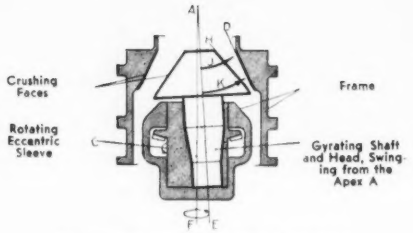


Fig. 1 — KUE-KEN CRUSHING PRINCIPLE

Figure 1 shows that the correct crushing motion of the Kue-Ken Gyratory is due to the proper location of the apex of gyration with relation to the crushing faces. The line AF is the center line of the frame, with the stationary crushing face D and the sleeve bearing C truly concentric with it. The line AE is the center line of the shaft and crushing head, and is off center or "eccentric" to the frame. Where these two lines meet above the crusher at A becomes the all important "apex of gyration." It is important because all parts of the crushing head must swing or gyrate from this point. Therefore, when swinging, all parts of the crushing faces must follow the path of an arch struck from the apex point A. Such arcs are shown at J and K. Check them with a pencil compass. Note how squarely these arcs pass through the crushing zone. Rock is instantly gripped and crushed between the crushing faces— *without slipping and rubbing*. Wear and power is reduced to the minimum—capacity is maximum.

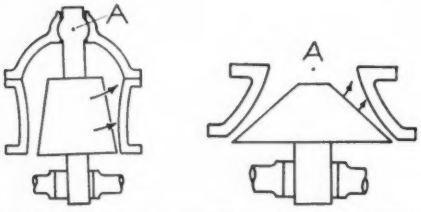


Fig. 2 — CRUSHING MACHINES WITH RUBBING MOTION

Figure 2 shows two commonly accepted types. Note that the location of the apex of gyration in relation to the crushing faces has apparently received no consideration. Other designs, with a curved crushing zone, must necessarily disregard the location of the apex, and are therefore included in this comparison. Consequently the arcs, also struck from apex points A and indicating the path of the crushing head, pass through the crushing zone at an acute angle, thus crushing with a glancing stroke, not squarely. This means that rock is forced upwards, slipping, rubbing and grinding away the costly crushing faces. Wear and power are excessive; and capacity is not what it should be.

COMPARE THESE CRUSHING PRINCIPLES WITH YOUR EQUIPMENT

1. PROTECTION. Kue-Ken* design moulded, flexible, oil-resistant seal. Completely protects the mechanism from dirt and grit . . . vital to successful, long-life performance.

2. SHAFTS AND BEARINGS are larger than in any other gyratory—18" crusher has 7" shaft, 3 ft. size a 12" shaft. Provides greater bearing area for cool running and longer life. Upper bearings are close under crushing head, reducing overhang and placing load more squarely on bearings.

3. LUBRICATION. Positive-type pump geared to shaft is submerged in oil—cannot lose its prime. Provides filtered "flood" lubrication to all parts. Automatic pressure switch protects against lubrication failure.

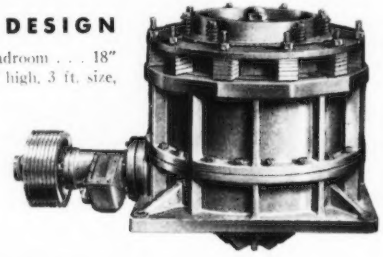
4. OVERLOAD RELEASE. This simple, automatic safety device protects crusher against tramp iron and overload. Easily set for any desired load.

5. CAST STEEL FRAME. Extra thick with tremendous strength to match the giant shafts, yet more compact and stronger than ordinary crushers.

6. FAST ADJUSTMENT. Positive, simple adjustment to make different sizes of product . . . takes average operator about five minutes to do the job.

MODERN DESIGN

Extremely low headroom . . . 18" crusher only 30¼" high, 3 ft. size, 45" high. Takes choke feed. No restricting spiders to reduce flow. No feeder needed. Usually requires shorter elevators.



THE KUE-KEN GYRATORY is the only gyratory that operates on the long-improved principle of "crushing without rubbing." This means more capacity with less power, less wear and lower upkeep.

Get complete facts. Write today for Bulletin 604.

Exclusive manufacturer for Eastern U. S., Canada and Puerto Rico: Pennsylvania Crusher Co., Broad and Arch St., Phila., Pa.

Licensed manufacturers for Australia: Tutt Bryant, Ltd., South St., Rydalmere, NSW.

*Pronounced One-Ken. U. S. and Foreign Patents Pending.

518 CHESTNUT STREET • OAKLAND 20, CALIFORNIA

STRAUB MFG. CO.

Kue-Ken Balanced Crushers	Rib Cone Ball Mills	Overflow Classifiers
Kue-Ken Simplex Crushers	Concentrating Tables	Feeders
Kue-Ken Gyratory Crushers	Overhead Eccentric Crushers	Screenwheel Classifiers

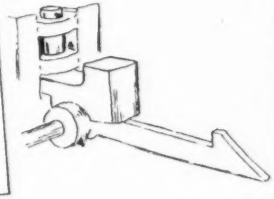
When every minute counts

You can depend on an EIMCO

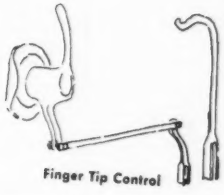
Saves Time Loading — Faster, more powerful bucket motion with EIMCO 5 cylinder reversible radial air motors.

6 Seconds

Saves Time Switching — Efficient, tailor-made couplings fit the customer's car and save as much as 25% of time loading car.

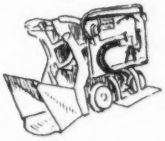


Saves Time With Operator — Easy moving, smooth operating controls make it possible for operator to do more work with less fatigue.



Finger Tip Control

Saves Time Out for Repairs — Rugged construction, anti-friction bearings and highest quality materials and workmanship assure lower maintenance costs per ton loaded.



Average service underground 4 years without repairs and before bringing out for checkup.

Your loader, with proper wheels and axles for your track, with proper arms and deck, bucket and coupler for your car, can be shipped on very short notice.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

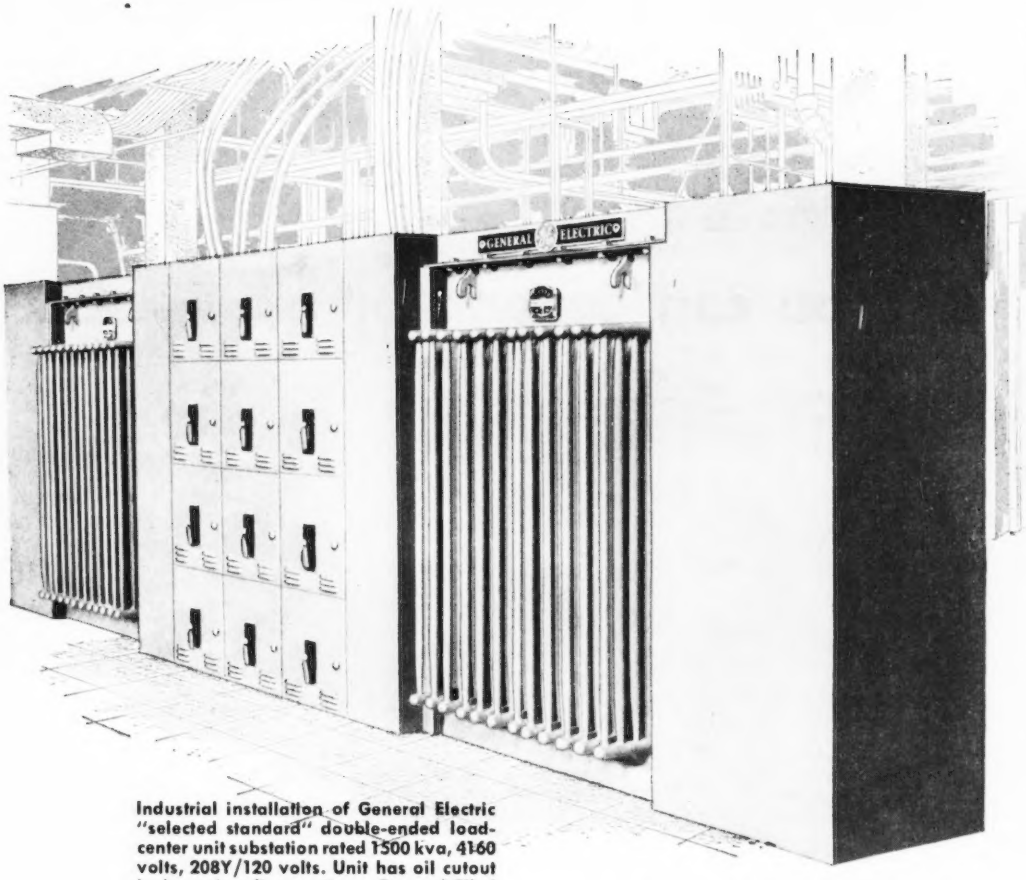
BRANCHES: NEW YORK, CHICAGO, BIRMINGHAM, EL PASO, SACRAMENTO, MANILA

AFFILIATED COMPANIES: SOCIETE EIMCO, PARIS, FRANCE
EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND

AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

82o9

new load center unit



Industrial installation of General Electric "selected standard" double-ended load-center unit substation rated 1500 kva, 4160 volts, 208Y/120 volts. Unit has oil cutout in incoming line sections, Pyranol-filled transformers, and the new AK-1 air circuit breakers.

★ *Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.*

substations

• improved appearance

Note the smooth, integrated appearance of these new G-E Pyranol® unit substations . . . no more gawky, "old-type" bus-duct connections between transformer and switchgear . . . now you can get the effortless flow of line and power that characterizes quality equipment for locations where appearance is a requisite.

• 'selected standards'

Based on surveyed demands of industry and proposed NEMA specifications, "selected standard" ratings have been inaugurated to bring you these efficient new load centers on shorter shipment. The most popular "selected standard" ratings are:

Low voltage—480△, 208Y/120 volts
High voltage—2.4, 4.16, 4.8, 12, 13.2, 13.8 kv
Kva ratings—300, 500, 750, 1000, 1500, 2000

Certain other "selected standard" load centers are available. Contact your G-E sales representative for further information.

• shorter shipments

By ordering "selected standards," you get really short shipments on Pyranol and dry-type load centers. Deliveries are in line with average plant construction schedules and it is suggested that load centers be ordered when construction begins.

• high impulse levels

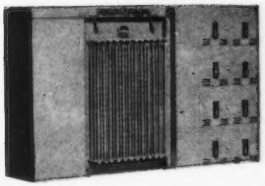
Pyranol unit substations with their inherently high impulse levels are particularly suitable for locations that are subject to switching surges and lightning.

Remember too, that G-E load-center power distribution is the most economical power distribution you can buy . . . no heavy, costly long-run feeders, no "piecemeal" purchases, no divided responsibility.

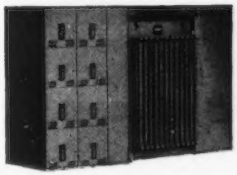
You'll save time too, because G-E "selected standard" load centers eliminate weeks spent over drawing boards detailing individual items; you'll save time because G-E factory-assembled unit substations are quickly and easily installed—in the center of the load area—with lower material and labor costs than required for "piecemeal" assemblies.

Ask your G-E sales representative *today* about how "selected standard" load centers can save time and money in your plant. Also, write for Bulletin GEA-3592.

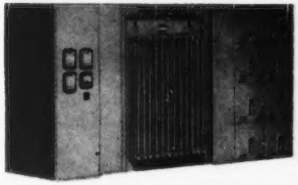
● *Apparatus Department, General Electric Company, Schenectady 5, New York.*



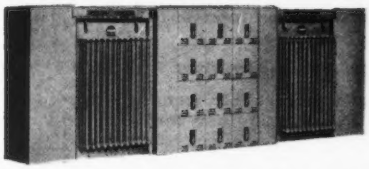
Typical 500 kva G-E "selected standard" load-center unit substation (standard arrangement). Unit consists of primary interrupter switch, liquid-filled transforming section, and low-voltage feeder switching section with the new Type AK-1 drawout breakers.



Same as unit shown above but with reversed arrangement.



Typical 500 kva G-E "selected standard" load-center unit substation with liquid-filled transforming section, metal-clad air power circuit breaker for incoming line-protection, and low-voltage feeder switching section with the new Type AK-1 drawout breakers.



G-E "selected standard" double-ended load-center unit substation rated 1500 kva with primary interrupter switches, liquid-filled transforming sections, and low-voltage feeder switching section with G-E Type AK-1 drawout air circuit breakers arranged for secondary selective service.

GENERAL ELECTRIC

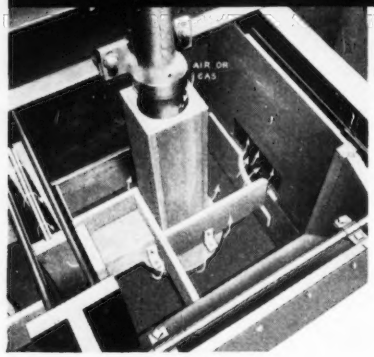
Use DENVER "Sub-A" (ACID TYPE) Flotation Machines

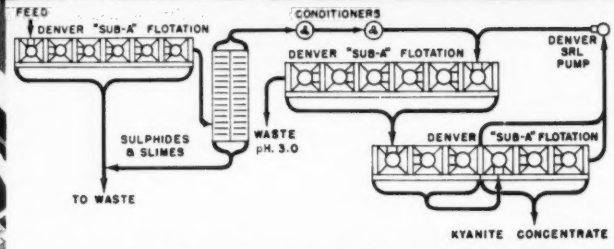
for treating:

Silica Sand
Feldspar
Mica
Kyanite
Sillimanite

and other

Non-metallics





Denver "Sub-A's" treat highly acid kyanite pulp at Commercialores, Inc., Clover, South Carolina

Read this complete story in July 1949 Pit and Quarry.

Following fine grinding in a 4' x 10' Denver Rod Mill, a 6-cell No. 15 Denver "Sub-A" Flotation Machine removes FeS_2 Tailings (containing the kyanite) of this pyrite circuit are deslimed and conditioned before going to the first 6-cell No. 18 (28 x 28) Denver "Sub-A" (Acid Type) Flotation Machine which produces a rougher concentrate from this highly acid pulp (pH. 3.0). The first three cells of second bank operate as a primary cleaner while the last three make a finished kyanite concentrate. No pumps are used in this cleaning and recleaning operation which utilizes the Denver gravity flow principle.

Flexibility of these machines makes it possible to feed from any quadrant or to remove tailings from any cell. Rubber-molded-to-metal wearing parts give greatest protection against abrasive and corrosive pulps. These factors are important in any flotation circuit.

If you have a Flotation Problem, write for Bulletin No. F10-B29.

Check these features:

- **Wood construction to handle acid pulp.**
- **Corrosion resistant fittings.**
- **Molded rubber wearing parts for abrasion and corrosion resistance.**
- **Flexibility permits feeding or tailing removal in any cell.**
- **Gravity return of concentrate for recleaning makes fewer pumps necessary.**

"The firm that makes its friends happier, healthier and wealthier"

DENVER EQUIPMENT COMPANY
1402 17TH STREET • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • EL PASO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG • RICHMOND, AUSTRALIA

2 BIG SAVINGS WITH ALUMINUM

Bore Hole Cables Cost Less Need Less Costly Supports

Figure it in aluminum to get the lowest-cost bore hole cable you've ever bought! You save two ways:

Bore hole cable with Alcoa E.C.* Aluminum Conductor *costs* less than copper of equivalent current-carrying capacity. But your savings don't stop there—

Aluminum is so much lighter that it eliminates the need for woven steel reinforcing and also lessens the cost of supporting structure.

Current capacity? Mine owners who have switched to aluminum report *more economical* power at working faces.

Alcoa makes light, strong, conductive E.C. Aluminum, which leading wire manufacturers draw, strand and insulate, and sell under their own trademarks. They have it with insulation that withstands mine waters, in all popular sizes. Ask your wire supplier, or write ALUMINUM COMPANY OF AMERICA, 1476J Gulf Bldg., Pittsburgh 19, Pennsylvania.

*E.C.: *Electrical Conductor* Aluminum

The BIG DIFFERENCE is in your COSTS!

ALCOA EC ALUMINUM

FOR ELECTRIC WIRE AND CABLE

Here is Plain PROOF...

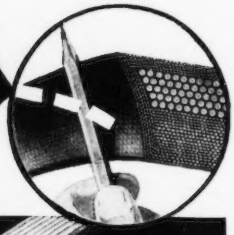
You can actually *feel* the sides of a belt *change shape* as the belt bends.

That the

CONCAVE SIDE

(U. S. Patent No. 1813698)

SAVES Transmission DOLLARS



When a *straight-sided* V-Belt bends around a pulley, three things are bound to happen.

(1) The top of the belt, being under tension, *narrows.* (2) The body of the belt, under compression, *widens.* (3) The sides of the belt *bulge out.*

These *shape changes* are inevitable. They are shown in figures 1 and 1-A, below.

Straight-Sided V-Belt.

How Straight-Sided V-Belt Bulges in Sheave-Groove.

Because this bulging belt does not fit the sheave groove, two facts become clear. (1) The belt will get excessive wear where it bulges—*shorter life!* (2) The whole side of the belt cannot *uniformly* grip the pulley—*a loss in drive efficiency.*

How different the V-Belt with the precisely engineered *concave* side (U.S. Patent No. 1813698)—the Gates Vulco Rope. As this belt bends it assumes a shape that *exactly* fits the sheave groove. (Figures 2 and 2-A, below.)

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave-Groove.

Two savings result. (1) The Gates Vulco Rope wears evenly—*longer life!* It's entire side-wall grips the pulley—no slip—*full delivery of power!*

The Mark of SPECIALIZED Research

The Concave Side is MORE IMPORTANT NOW Than Ever Before

Because the sides of a V-Belt are what actually drive the pulley it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

498

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
"The World's Largest Makers of V-Belts"

WICKWIRE ROPE

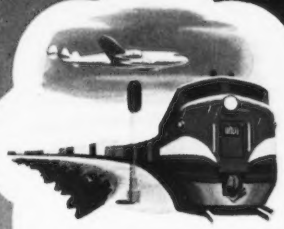
A PRODUCT OF CF&I

Ask any user . . . you'll find them everywhere

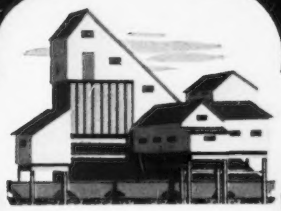
In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISSCOLAY® Preformed. It lasts longer — is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant — Palmer, Mass.

IN THE EAST—Wickwire Spencer Steel Div. of C. F. &I.
500 Fifth Ave., New York 18, N. Y.
IN THE ROCKIES—The Colorado Fuel and Iron Corp.
Continental Oil Bldg., Denver, Colo.
ON THE WEST COAST—The California Wire Cloth Corp.
1060—19th Ave., Oakland 6, Cal.

LOGGING



TRANSPORTATION



MINING

PETROLEUM

MANUFACTURING

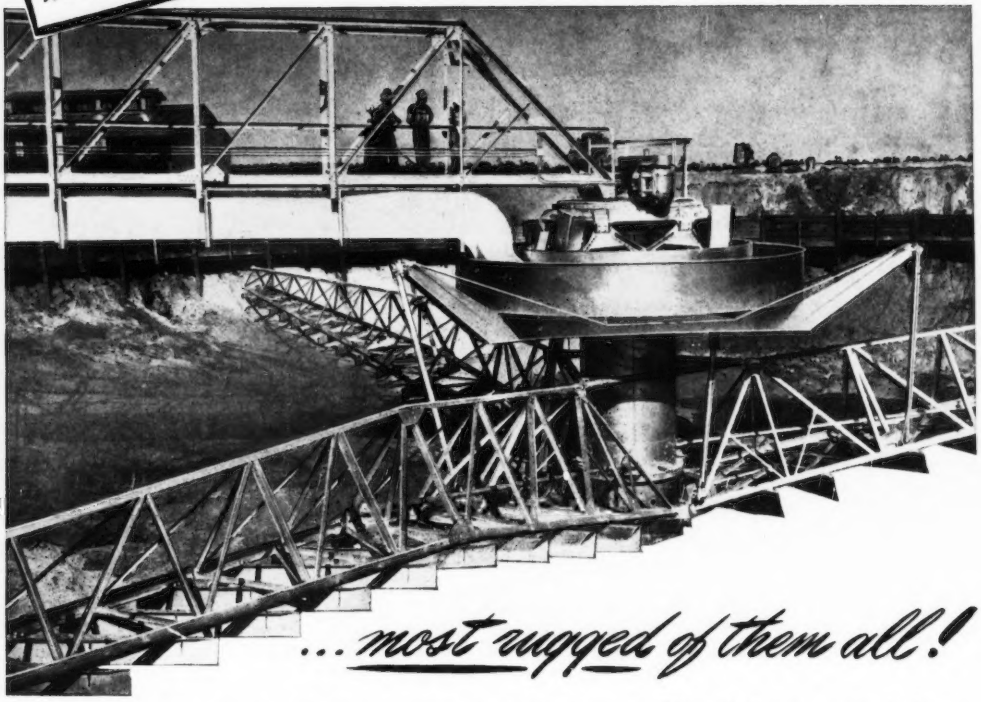
MARINE

CONSTRUCTION

A. E. Brolmon

What's NEW... in heavy duty equipment?

The Dorr Type PL Parallel Lift Hydroseparator



... most rugged of them all!

Sweeping statement? Perhaps . . . but look at these facts and see why the new Dorr Type PL tops them all for heavy duty operation.

PL MEANS PARALLEL LIFT OF RAKES IN CASE OF OVERLOAD

As overload is encountered, torque causes entire raking mechanism to raise with rakes parallel to tank bottom . . . no matter where point of load occurs.

In case of shut-down, a powerful hydraulic lifting device will raise raking mechanism up to 2 feet off tank floor. Parallel and hydraulic lifts are integrally designed . . . with hydraulic lift cylinders acting as shock absorbers in case of sudden torque loads and eliminating sudden drop of raking mechanism.

Drive unit is low center of gravity, balanced spur gear drive delivering 800,000 foot pounds torque. Twice as powerful as any drivehead yet developed for similar duty!

TRIANGULAR CONSTRUCTION THROUGHOUT

Three rake arms . . . of triangular truss construction. All Type PL structural members form triangles for maximum rigidity and strength.

"Non plug" center cone discharge, kept open by a special "tickler" scraper . . . simple, single turntable design . . . both add to the ability of the Type PL to handle the heaviest loads without balking.

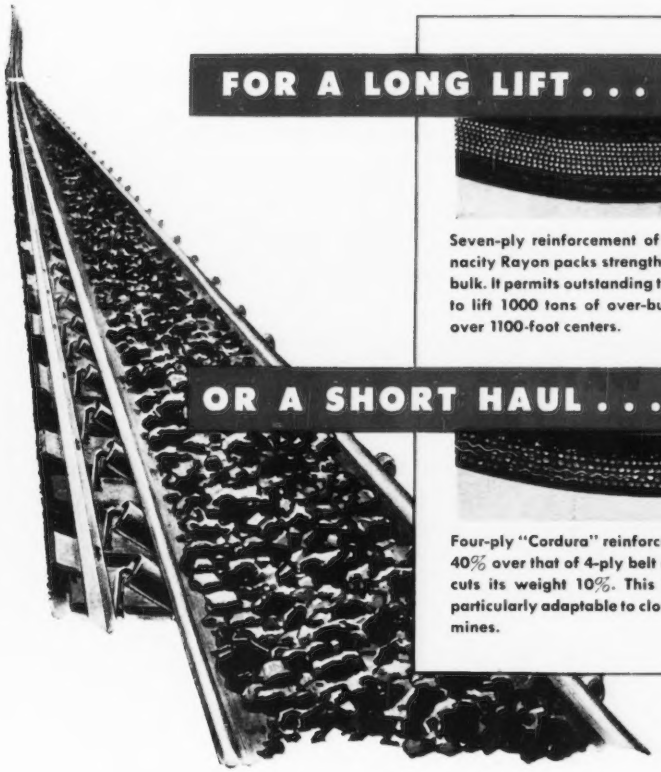
Where units of 100' diameter and larger are required in phosphate rock, sand, coal or any field where the going is really tough . . . the Dorr Type PL is the answer. A Dorr engineer will gladly give you more detailed facts on this new development.

DORR

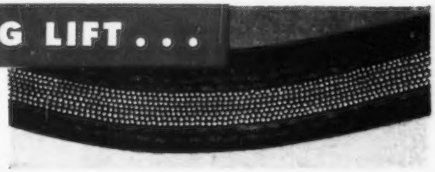
RESEARCH ENGINEERING EQUIPMENT

DORRCO

THE DORR COMPANY, ENGINEERS
570 LEXINGTON AVE., NEW YORK 22, N. Y.
ATLANTA • TORONTO • CHICAGO
DENVER • LOS ANGELES
RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.
SUGAR PROCESSING
PETREE & DORR DIVISION, NEW YORK 22, N. Y.
ASSOCIATES AND REPRESENTATIVES
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.



FOR A LONG LIFT . . .



Seven-ply reinforcement of Du Pont Cordura* High Tenacity Rayon packs strength into this belt with minimum bulk. It permits outstanding troughability. Belt is designed to lift 1000 tons of over-burden per hour up 15° slope over 1100-foot centers.

OR A SHORT HAUL . . .

Four-ply "Cordura" reinforcement increases belt strength 40% over that of 4-ply belt of conventional material, yet cuts its weight 10%. This light, highly flexible belt is particularly adaptable to close operations in underground mines.

Du Pont "Cordura" Rayon means better belt performance

This high-tenacity rayon is engineered to produce far greater inherent strength than natural fibers commonly used.

Check the various ways in which high unit strength of Du Pont "Cordura" Rayon can help you get improved belt service and greater economy. We'll be glad to furnish the names of suppliers of belts made with "Cordura," as well as detailed information on "Cordura" itself. Address Room 4529, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Look to "Cordura" Rayon for these conveyor belt advantages:

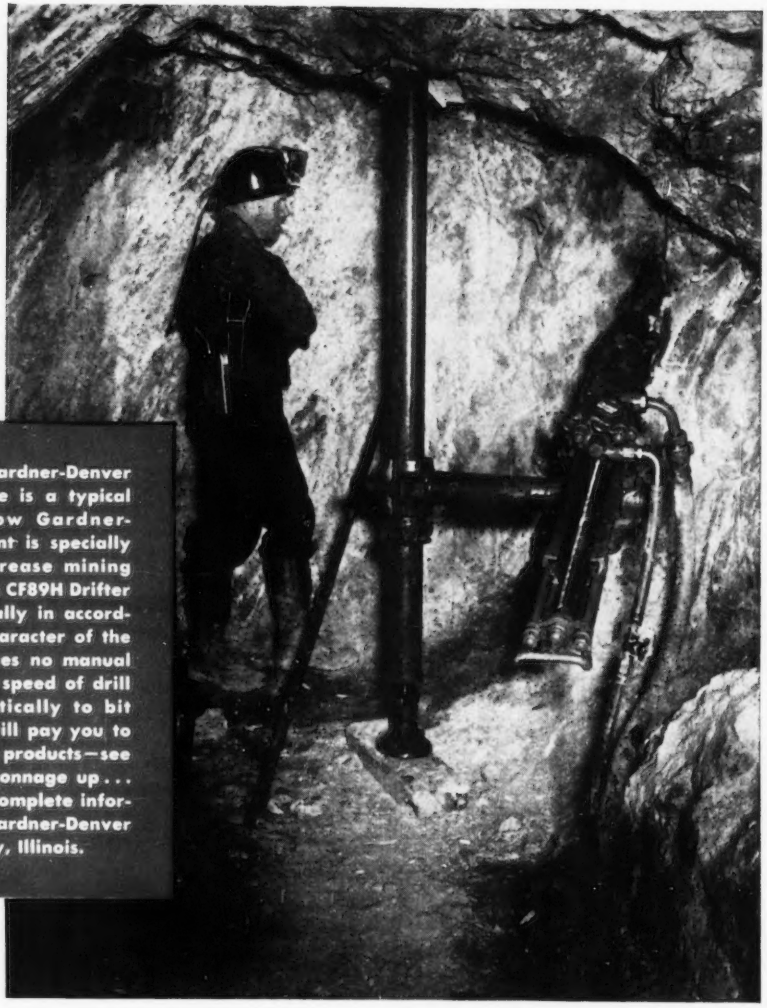
- ★ *Greater tensile strength*
- ★ *Longer life*
- ★ *Heavier loads*
- ★ *Improved troughability*
- ★ *Longer lifts with fewer transfer points*
- ★ *Lighter belts that are easier to set up*
- ★ *Resistance to flexing*
- ★ *Resistance to loading impacts*
- ★ *Reduced operating power expense*

DU PONT "CORDURA" HIGH TENACITY RAYON

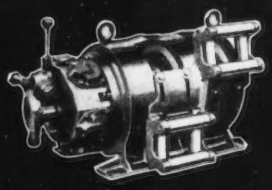
For RAYON . . . for NYLON . . . for FIBERS to come . . . look to DU PONT

boosting tonnage

THE EASY WAY...



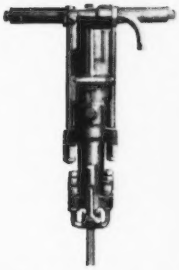
—and that's the Gardner-Denver way. Shown here is a typical example of how Gardner-Denver equipment is specially designed to increase mining productivity. This CF89H Drifter feeds automatically in accordance with the character of the ground... requires no manual adjustment since speed of drill adjusts automatically to bit penetration. It will pay you to look over these products—see why they keep tonnage up... costs down. For complete information, write Gardner-Denver Company, Quincy, Illinois.



GARDNER-DENVER HME AIR-SLUSHER—a compact, lightweight air hoist for big-tonnage slushing. 5-cylinder radial air motor develops high rotative power, even at low speed. Single throttle lever controls slusher speed and direction.

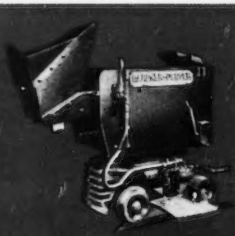
GARDNER-DENVER R94 STOPER — a new, fast-drilling, self-rotating stoper weighing only 100 pounds. Perfectly balanced between drilling speed and power of feed at all pressures, it can't "nose dive." Working parts completely protected against abrasive sludge.

GARDNER-DENVER R104 STOPER — famous heavy-duty, self-rotating stoper with exceptionally high drilling speeds. Perfect physical and operative balance makes it a favorite with drill runners. Automatic system of cleaning air keeps water and sludge out of front end.

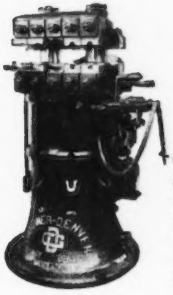


GARDNER-DENVER S55 SINKER — an easy-to-handle, hard-hitting sinker. Powerful rotation, striking power and hole cleaning ability make it the most popular 55-pound sinker on the market.

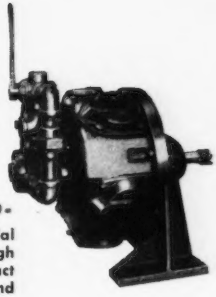
GARDNER-DENVER WB VERTICAL WATER-COOLED COMPRESSOR — a space-saving, two-stage compressor with efficiencies comparable to large horizontal compressors. Combination radiator and air-cooled intercooler permits operation where cooling water is a problem.



GARDNER-DENVER GD14 MINE CAR LOADER — the "Big Bite" loader with wide clean-up range. Two high-torque, 5-cylinder radial air motors assure powerful crowd and fast discharge on minimum air pressure.



GARDNER-DENVER DS6 SHARPENER — a fast acting sharpener with maximum capacity for forging bits and shanks on largest sections of drill steel. Handles wide range of bits without changing fuller dies or gauging dies. Low air consumption.



GARDNER-DENVER AIR MOTORS — versatile 5-cylinder radial air motors with high torque for high starting loads. Remarkably compact — bring the flexibility, safety and convenience of air power to underground drive applications.

GARDNER-DENVER *Since 1859*

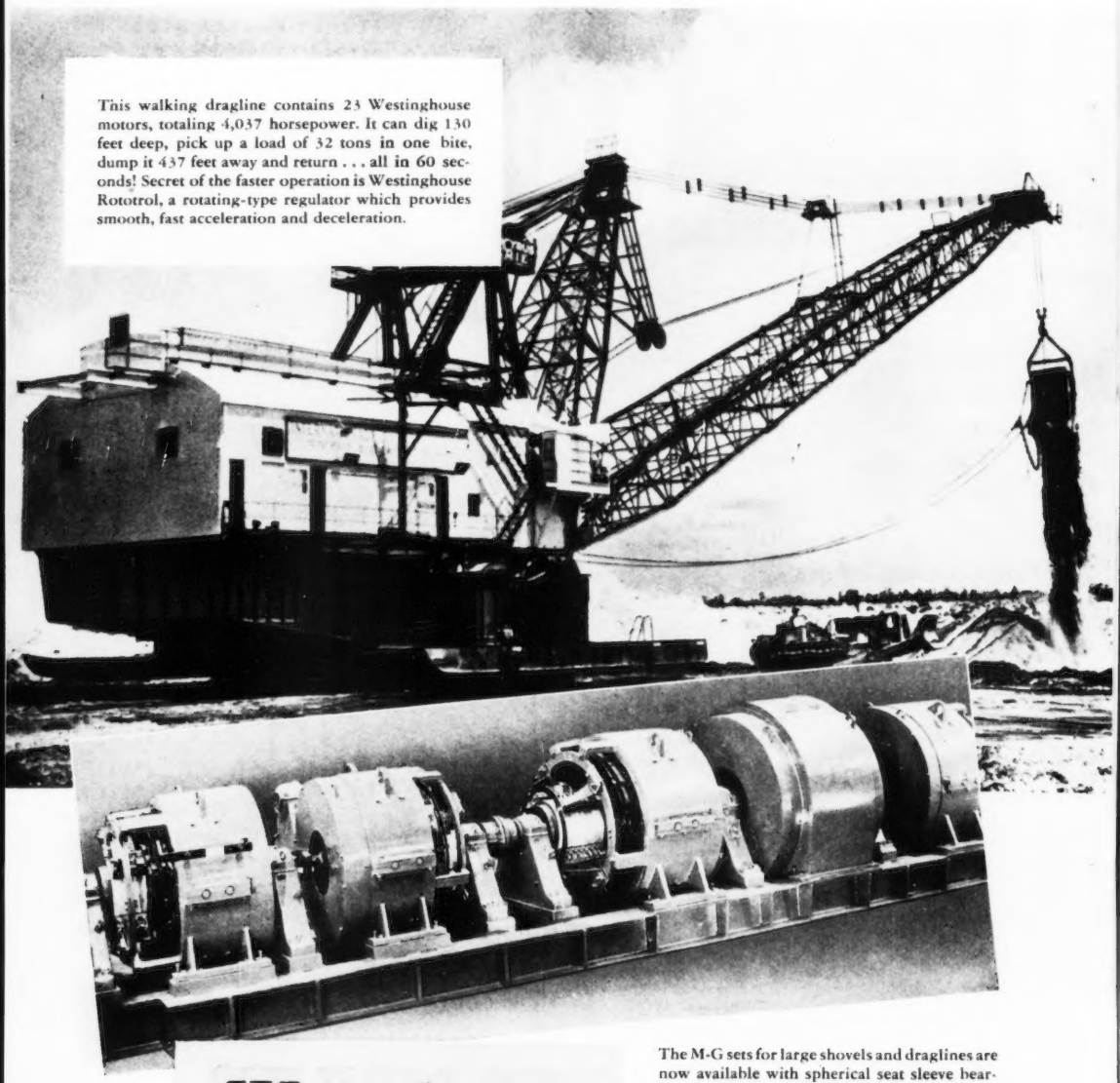
Gardner Denver Company, Quincy, Illinois

In Canada: Gardner Denver Company (Canada) Ltd., Toronto, Ontario

YOU CAN BE SURE.. IF IT'S

Westinghouse

This walking dragline contains 23 Westinghouse motors, totaling 4,037 horsepower. It can dig 130 feet deep, pick up a load of 32 tons in one bite, dump it 437 feet away and return . . . all in 60 seconds! Secret of the faster operation is Westinghouse Rototrol, a rotating-type regulator which provides smooth, fast acceleration and deceleration.



The M-G sets for large shovels and draglines are now available with spherical seat sleeve bearings. This new development compensates for misalignment and provides adequate lubrication even under severe operating conditions and tilts up to 15°.

Westinghouse

Westinghouse-equipped draglines and shovels

FOR MORE TONS PER MAN-HOUR

Some two-thirds of all large draglines in use in this country are Westinghouse equipped. Many of these are in use by operators who have again and again specified Westinghouse equipment.

For instance, one northern Illinois coal company and an associated company have purchased a total of four large draglines in the past few years. Each time Westinghouse equipment was specified. Another case is a Pennsylvania coal operator who has purchased three such draglines on all of which Westinghouse equipment was specified.

There must be reasons why Westinghouse equipment is so well liked by operators who have tried it. Here are a few of them—

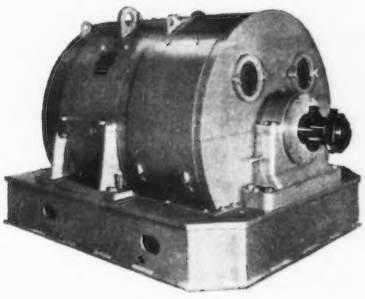
Smooth operation is brought about by Rototrol. This rotating regulator developed by Westinghouse makes possible speed changes with less strain, resulting in less maintenance and smoother operating characteristics throughout.

Fast operation comes from the higher bucket-lowering speeds of the large Westinghouse drive motors. It comes, too, from the fast swing cycle and accurate spotting of bite and drop that Rototrol makes possible.

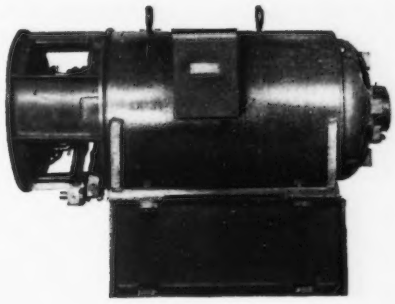
Reliable operation of Westinghouse equipment reduces down time. For example, Rototrol is the simplest of all rotating controls, both as to apparatus and circuits. The large M-G sets are equipped with spherical seat sleeve bearings designed to permit continuous operation even at tilts of up to 15°. Many of the small motors have sealed, pre-lubricated bearings that require no lubrication, and that have a *proved* record of lower maintenance.

This co-ordinated equipment for shovels and draglines is a product of the more than half a century during which Westinghouse engineers have worked with the Mining Industry. If you are interested in handling more tons per man hour, let our Mining Industry Specialists help you work out the answers. Call your nearest Westinghouse Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94809



In large drive motors such as this, the use of poleface compensated winding makes possible a smaller armature diameter and a lower WR^2. This feature is available both on the 425-hp motor and the 600-hp motor now being offered for use on shovels and draglines.



This is the Rototrol unit that has revolutionized performance of shovels and draglines. By eliminating the sharp changes and attendant strains of Magnetic Control previously used, Rototrol speeds operation and reduces maintenance costs.

BEATS A FLEET!

Even a fleet of trucks couldn't match the big volume, low-cost ore handling job this S-A designed conveyor system does at this iron mine! Fast movement of more ore, less maintenance and elimination of a long uphill haul by trucks over winding roads were all accomplished as planned when this S-A ore handling system was installed.

For nearly half a century S-A engineers have been designing and installing big volume, low cost bulk materials handling systems to meet specific requirements in every field of industry. Their "Know-How" learned from years of experience plus the S-A line that includes every type of conveyor, enables them to recommend the *one best* system *every* time.

Put the experience of S-A engineers to work for you. Write today.

CLEVELAND CLIFFS IRON COMPANY
CANISTEO MINE
NEAR BOVEY, MINNESOTA

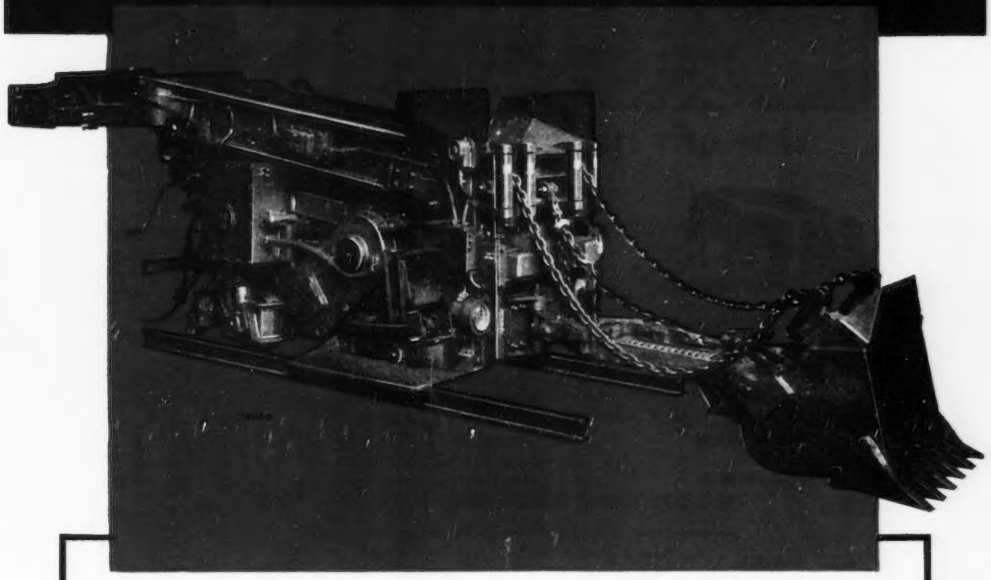
The S-A designed and equipped handling system for this iron mine consists of three separate belt conveyors, linked together at transfer houses, carries ore up 18° incline from truck hopper dumping station in bottom of open pit to ore washing plant at top. There, ore is washed, screened, crushed and loaded into rail cars for shipment to lake port ship loading docks. This S-A conveyor system is 1000 ft. long . . . belts are 30" wide . . . capacity is about 700 tons per hour.

STEPHEN S-A ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. · Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

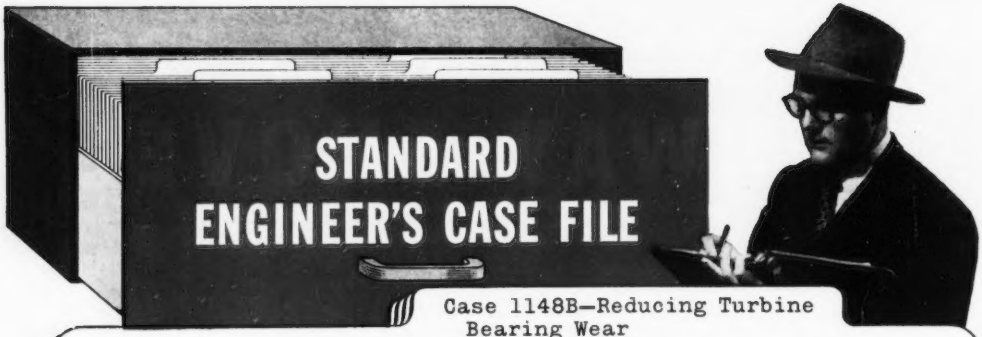
The GOODMAN *Type* 120
CONWAY SHOVEL



. . . an easily handled, fast working little mucker for small bore tunnels in metal mines. It is equipped with friction clutches that permit powerful crowding into the muck pile without overloading; a 50 degree side swing of the loading boom to either side of the centerline permits good cleanup. Seven complete loading cycles per minute are possible with an 8¼ cu. ft. capacity dipper.

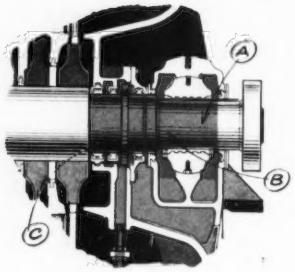
Send for Bulletin CL-491. It gives you the details of this machine as well as of the larger Conways that have been used in practically all of the major tunnel projects in the U.S.A. during the past 18 years.

HALSTED ST. AT 48TH GOODMAN MANUFACTURING COMPANY **CHICAGO 9, ILLINOIS**



STANDARD ENGINEER'S CASE FILE

Case 1148B—Reducing Turbine Bearing Wear



TURBINE BEARING

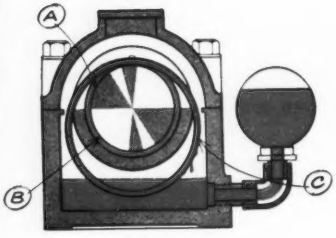
There was no sign of acidity or deterioration in Calol OC Turbine Oil when, after six years use in a heavily-loaded turbine, a sample was given a laboratory analysis. Bearings and other parts showed practically no wear and the entire lubrication system was clean and functioning with maximum efficiency. Recommended for all steam turbine lubrication and as the medium in hydraulic units. There is a grade for every service.

A. Has excellent metal-wetting ability — resists the heaviest bearing and gear loads and assures constant lubrication.

B. Contains a highly effective oxidation inhibitor — prevents the formation of lacquer, gum, and sludge deposits on parts and in oil and hydraulic systems.

C. Corrosion inhibitor stops rusting — Calol OC Turbine Oil in both salt and fresh water tests kept steel strips from rusting while they were immersed in the water-oil mixtures for 48 hours.

Case 1163—Cutting General Bearing Maintenance Costs



RING-OILED BEARING

Specially compounded Calol Red Engine Oil X, used for all general lubrication in lumber mills, cut bearing wear, reduced rebabbitting and replacements 50%, lowered oil consumption 30%, and materially reduced expenses. Recommended for all types of plain bearings. A suitable grade for every service condition.

A. Contains special additives—makes the oil adhere to bearings and moving parts.

B. Provides a tough "oilskin" film that resists heavy loads and high temperatures.

C. Picks up easily on ring oilers...may be applied by all types of oiling systems.

The tenacity of film and high lubricating qualities of Calol Red Engine Oil X reduces consumption, allows less frequent oiling, cuts starting torque and wear, and keeps bearings cooler.

For additional information and the name of your nearest Distributor, write

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street, San Francisco 20, California

The California Oil Company
Barber, N. J.—Chicago, Ill.

The California Company
17th and Stout Streets, Denver 1, Colo.

Standard Oil Company of Texas
El Paso, Texas

CALOL

Trademark Reg. U.S. Pat. Office

Get your copy of J&L'S NEW WIRE ROPE HANDBOOK

J&L STEEL

for the man on the job

Pocket size • easy to read • up-to-date

Here's the new illustrated J&L Wire Rope Handbook . . . written for the man who handles wire rope *on the job.* It contains 96 pages of information to help *you* get the most out of the wire rope on your machine.

It's easy to understand . . . it has the answers to many of your questions about wire rope . . . it's yours for the asking. Thousands of men have already put this book to good use. Why not send for your copy now?

It tells you about

- **installation and operation**
- **selecting the right rope**
- **J&L wire rope maintenance**
- **standard fittings, slings, and splicing service available with J&L wire rope**

Recommendations for:

Excavating Equipment
Oil Country Uses
Marine Applications
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Logging Installations

Send the coupon for your copy now!

Jones & Laughlin Steel Corporation
412 Jones & Laughlin Building
Pittsburgh 19, Penna.

Please send me a free copy of the new wire rope handbook entitled "Wire Rope is a Machine."

Name _____

Company _____

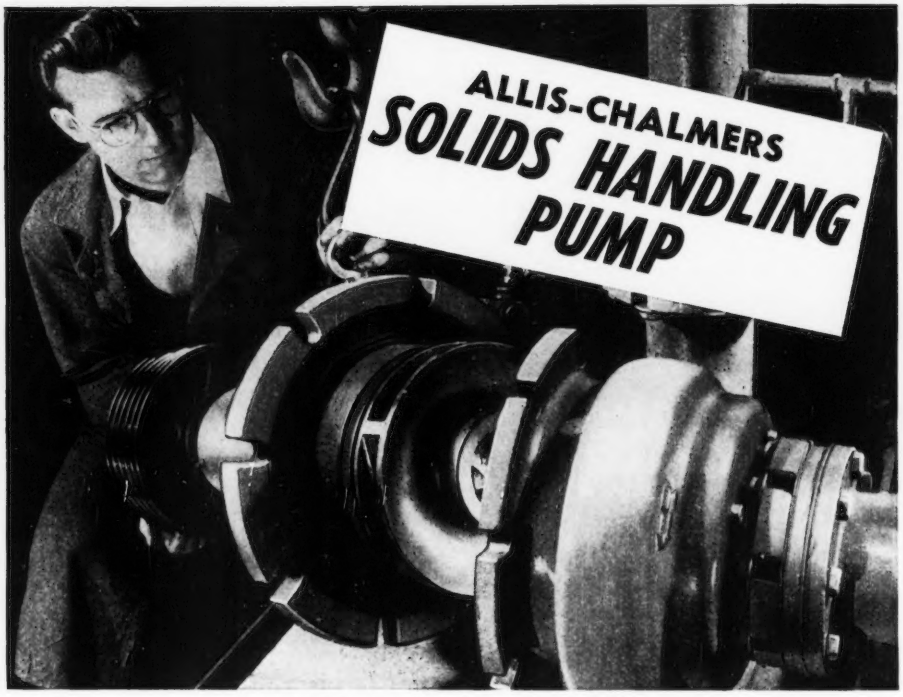
Address _____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Only ½ Hour to Service!



ALL SOLIDS HANDLING PUMPS require periodic replacement of worn parts. This Allis-Chalmers "CW" pump saves you money because parts replacement is easy, fast and economical. The entire pump can be dismantled and reassembled in a half hour without disturbing piping.

Parts with varying rates of wear are separated. Only worn parts need be replaced. Three sets of bearings, brackets and shafts cover entire range of pump sizes . . . reducing parts inventories as much as 2/3!

USERS REPORT LONG WEAR

Experiences of operators prove that the combination of *Allisite*, an abrasion-resistant alloy, *heavier construction* and expert *application engineering* give the "CW" pump longer wear between servicings. Users say:

"Spent $300 a month for maintenance on previous pump. A-C solids handling pump has required only routine lubrication in nine months."

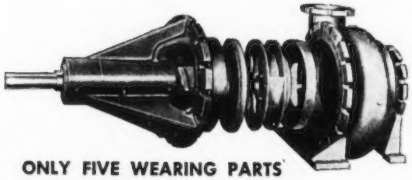
"A-C solids handling pump gives 350 hours service compared with 80 hours on best previous pump."

"Part needing most frequent replacement has approximately ten times the life of same part on previous pump at approximately same initial cost."

An A-C representative will be glad to give you additional facts and figures on possible savings for you. Or write for Bulletin 6381. A-2766

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

Allisite is an Allis-Chalmers trademark.

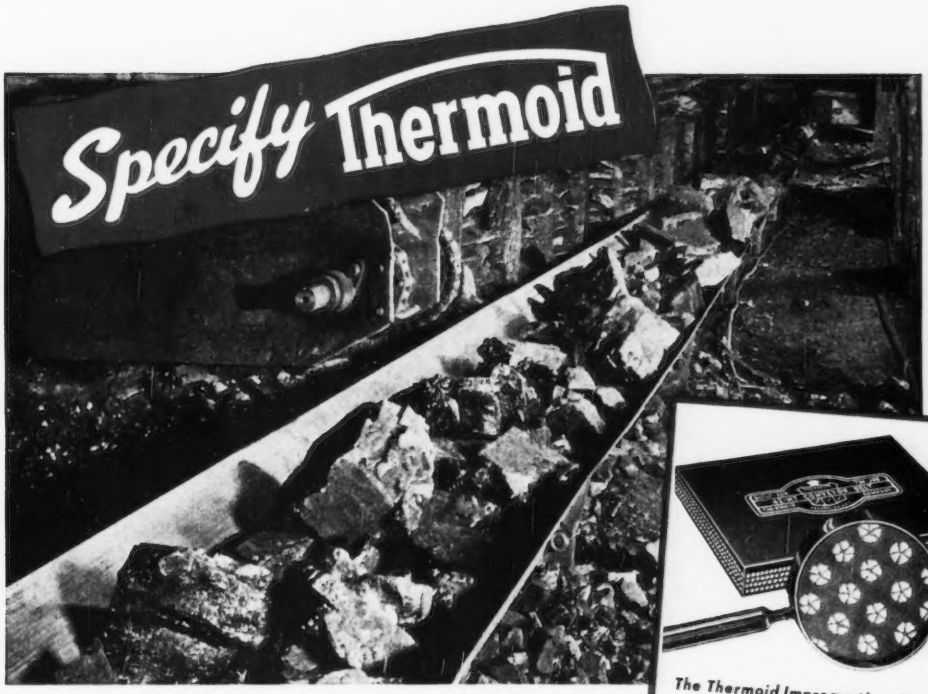


ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



Thermoid Impregnation Process Assures Longer Conveyor Belt Life

Thermoid Conveyor Belts are Built for the Job!

For over 68 years, Thermoid has worked with mine operators to develop rubber products to withstand the acidity, moisture and abrasion encountered in mine operations. The result . . . a complete line of Thermoid Conveyor Belts for every major mining application.

Your nearest Thermoid distributor can service your requirements . . . or if you prefer, write us of your problem and we will furnish full details.

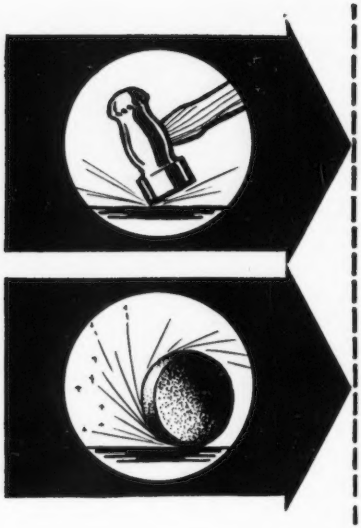
It will pay you to *Specify* Thermoid!

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

Thermoid Company

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U.S.A.
Industrial Rubber Products • Friction Materials • Oil Field Products



IMPACT

ABRASION

COSTLY WEAR FACTORS IN MILLING COUNTERED BY AMSCO® ALLOY STEELS

AMSCO STANDARD MANGANESE STEEL

"The toughest steel known" resists abrasion well under severe impact. Here's a service comparison of liners in a Colorado gold mine.

MATERIAL	TONNAGE GROUND
Heat treated alloy steel	87,838
AMSCO standard manganese steel	131,729

AMSCO SPECIAL MANGANESE STEEL

For greater wear resistance than standard manganese steel . . . and to withstand shocks equally well.

Material	Service	Tonnage Ground
Standard manganese steel	6 mo.	17,256
AMSCO special manganese steel	10 mo.	24,618

AMSCO CHROMIUM-MOLYBDENUM STEEL

Where impact resistance is secondary to extreme abrasion resistance, use Amsco uniform analysis "chrome-moly."

Material	Cost per Ton Milled
Standard manganese steel	.007405
AMSCO chromium-molybdenum steel	.006839

In your grinding mill two powerful forces of wear are always there . . . impact and abrasion. The extent to which each of these forces is present depends on a number of factors that vary with every mine. Among these factors are: type and condition of ore, size and speed of mill, size and total load of balls or rods, and design of liner.

It is in the correct weighing of all these factors that our experience added to yours can be of tremendous service. As a result of Brake Shoe research and development, we can recommend the particular alloy to use for all of the internal castings of your mill . . . to give optimum resistance to impact or abrasion (according to grinding conditions) and thereby greater tonnage before replacement is necessary. Amsco now offers mill parts such as liners, grates, and feeder lips in a range of alloy steels to meet most combinations of impact and abrasion. The case histories on liners listed here show typical results when Amsco recommended steels are used.

All uses for Amsco castings in mines and quarries are described in Bulletin 743M

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

P&H

"King of Swing"

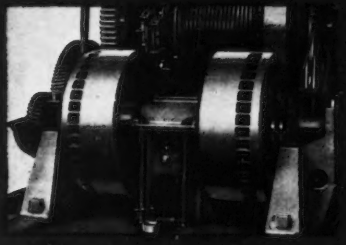
wherever big shovels work!

In the entire field of large excavators, there's nothing to compare with the "Magnetorque" swing on the P&H Model 1055.

It's faster — up to 20% faster! That means more yards per shift — greater earning power. It's smoother — with "cushioned" starts and stops — easier on shafts, bearings and gears. It's more dependable — insures steadier operation — no time out for adjustments and replacement of linings. Best of all, it's simple — control system is free of complicated switch gear — easily understood.

All this adds up to trouble-free operation at absolute minimum cost.

Ask any owner of a P&H 1055. He'll tell you, "It's the slickest swing in the business!"



P&H 1055-3½ YD. SHOVEL

P&H EXCAVATORS

This Air Compressor CAN'T BLOW UP...

It's Equipped with a BS&B SAFETY HEAD

The Black, Sivalls & Bryson SAFETY HEAD, containing a rupture disc which bursts at a predetermined pressure, stands sleepless guard over this air pressure system. Whenever overheating, mechanical failure or a faulty control causes a suddenly mounting *over pressure*—a relief valve may not react to it, but the BS&B SAFETY HEAD does! Before the critical point, it bursts . . . and disaster is averted! Investigate this inexpensive protection for *your* property now. Write today to Special Products Division, Black, Sivalls & Bryson, Inc., Power & Light Building, Kansas City 6, Missouri.

Hold-down flange of bolted type SAFETY HEAD assembly—furnished with threaded, welded or flat outlet.

Rupture disc—bursts at a predetermined pressure—guaranteed when sold to burst within 5% of specified pressure.

Base flange, bolted type. BS&B SAFETY HEAD flanges can be made to order to suit special conditions. Available with bursting pressures from 5 lbs. to 30,000 lbs.

EFFICIENCY RELIABILITY

FOREIGN INQUIRIES INVITED Cable Address: BLACK, KANSAS CITY, U.S.A.

BLACK, SIVALLS & BRYSON, INC.

KANSAS CITY, MO. OKLAHOMA CITY, OKLA.

LOW

These letters stand for Low Cost per Unit of Work — the *real* yardstick in measuring wire rope economy.

Once in a while you may run across a wire rope that's lower in first cost than Bethlehem's. But with wire rope as with anything else, first cost isn't the true measure of economy. The rope with the higher price tag may be much more economical in the end — because of the longer, better service it gives. On the basis of long-range economy — *true* economy — we'll stack Bethlehem rope against the field.

Cost per Unit of Work is a flexible term, varying with different industries. It can mean the rope cost per yard of rock moved by a power shovel; the rope cost per ton of coal pulled up a hillside; or the rope cost per ton-mile in oil-country drilling. But however you use wire rope, whatever your system of records, you can be sure of this: Bethlehem wire rope means *low* Cost per Unit of Work.

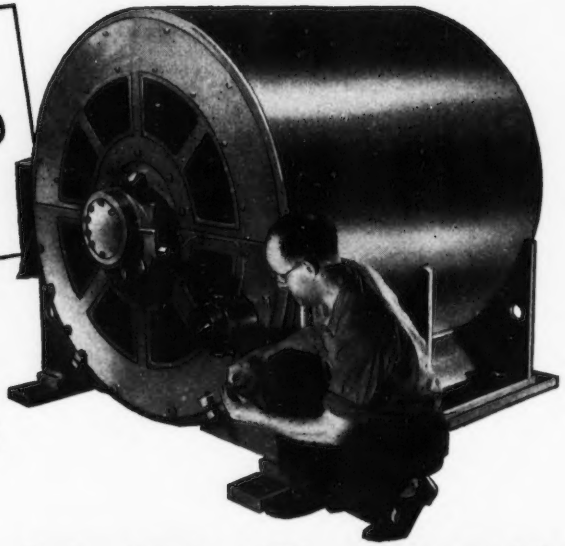
That's because the Bethlehem product is a quality product all the way through — one that is conscientiously made from crown wires to core.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

*LOW COST PER UNIT OF WORK

TUBE-TYPE
TOTALLY-ENCLOSED FAN-COOLED MOTORS!

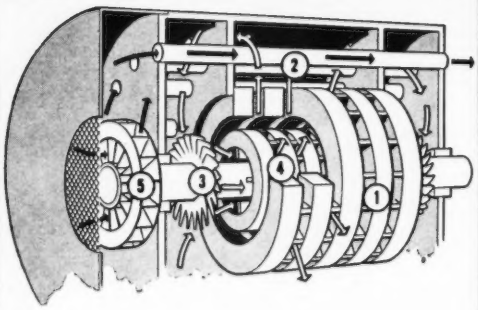


DIRT-

AND CORROSION-RESISTANT!

PROOF!

How Tube Cooling Works



Stator core (1) is surrounded by tubes (2). Internal fans (3) circulate air through ducts (4) in rotor and stator and around tubes, transferring heat to tubes.

External fan (5) drives outside air through tubes, removing heat and keeping tubes clean. All electrical parts are enclosed. Dirt cannot enter.

*Totally-Enclosed Fan Cooled

- **Install anywhere – indoors or out**
- **Heat exchanger is practically *self-cleaning***
- **Sizes . . . 75 to several thousand horsepower**

THIS ALLIS-CHALMERS tube-type TEFC* motor practically eliminates cleaning and other high maintenance costs associated with large motors exposed to dirty and corrosive atmospheres. And it does this with a simple, self-contained, tube-type, ventilating system.

All electrical parts — including the stator core — are enclosed. The simple heat transfer system keeps temperatures well within rated limits. Cleaning is rarely needed because air passages are unrestricted. Air flow through the straight tubes removes foreign matter.

Three years of field operation have proved important savings. Sizes from 75 hp and up. Also explosion-proof designs. For complete information, outline your requirements to your A-C Sales Office, or write for Bulletins 05B7150 and 51R7149.

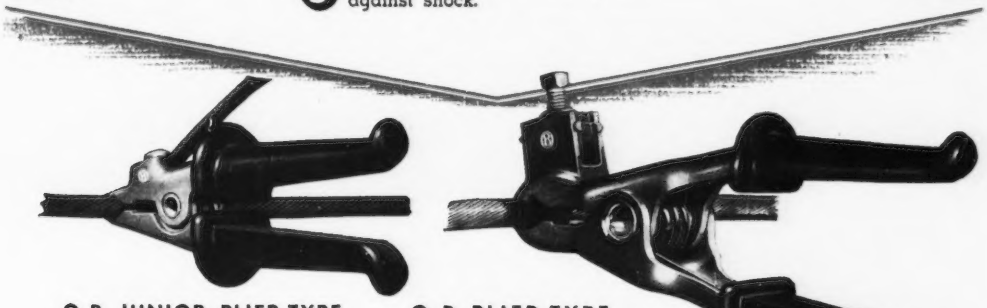
A 2664

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

MAKE QUICK, POWER-TIGHT CONNECTIONS WITH O-B Ground Clamps

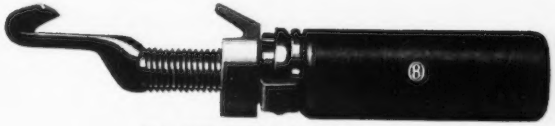
1. Tight mechanical connections to rail, rail bond or negative feeder prevent power leakage.
2. Full current-carrying capacity helps keep your electrical system in balance.
3. Strong clamping grip "stays put" despite cable twisting.
4. Clamps for all types of grounding —rail, rail bond and negative feeder—are easy and quick to connect.
5. Fully insulated handles protect against shock.



O-B JUNIOR PLIER-TYPE GROUND CLAMP Similar to the larger size plier-type in design, the Junior will take machine wires No. 4 and smaller. Catalog No. 19907.

O-B PLIER-TYPE GROUND CLAMP Spring-actuated bronze jaws tightly grip rail base, rail bond or negative feeder. Adjustable cable clamp will handle cable sizes as large as 4/0. Catalog No. 19383.

O-B BULLDOG RAIL CLAMP Using the same principle as Bulldog Clamps, this ground clamp can be attached quickly to the rail base by a twist of the rubber handle. Can handle machine cables up to No. 2. Catalog No. 16658.



O-B MINE RAIL CLAMPS This clamp fits under the rail with the jaws gripping the rail base on both sides. The handle screws tight on the threaded jaw. This clamp will take cables sizes No. 2 and smaller. Catalog No. 14627.

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

The CASE of The HUNGRY MILL

There were once two grinding mills running side by side. One ate only moderate amounts of raw ore and yet seemed always overloaded, never able to turn out the tonnage expected of it. The other mill was a MARCY Low Pulp Line mill. It ate raw ore ravenously—never seemed to get enough, and always delivered more than 100% of its grinding capacity rating. The difference in performance of these two mills was the result of the way each was built.

The first mill was a typical trunnion overflow mill which always runs nearly half full of pulp at normal speeds. The result is a volume of pulp which tends to buoy up or cushion the grinding medium and allows the all too familiar balanced load condition which cannot utilize all the power made available by the driving motor.

The MARCY Mill, because of its low pulp line, always seemed nearly empty. The pulp was much thicker, and the grinding medium, coated with thick pulp, delivered a full impact drop, crushing the ore much faster. Because of the pulp thickness and the smaller pulp volume, the load was fully unbalanced; the driving motor had to deliver full torque to pull this higher effective load, which in this instance paid off in 29.6% faster grinding and proportionately lower costs per square foot of floor space.

This is a true story taken from records of operating milling plants. The point is that no other design of grinding mill can equal the capacity of a Low Pulp Line MARCY, size for size. If this is of any importance in your grinding section, ask us to give you the facts on MARCY grinding under your conditions. Our engineers can show you how MARCY mills will save you money in other ways too. Write for our free engineering services.

OTHER PRODUCTS

Massco Fahrenwald Flotation Machines; Genuine Wilfley Tables; Massco-McCarthy Hot Millers; Rock Bit Grinders; Density Controllers; Belt Feeders; Rubber Pinch Valves; Assay and Laboratory Supplies and Equipment; Complete Milling Plants.

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Representatives: Canadian Vickers, Ltd., Montreal; W. R. Judson, Santiago and Lima; The Edward J. Nell Co., Manila, P. I.; Sterling Chemical & Ore Corp., 80 Broad St., New York 4, N. Y., for Continental Europe.

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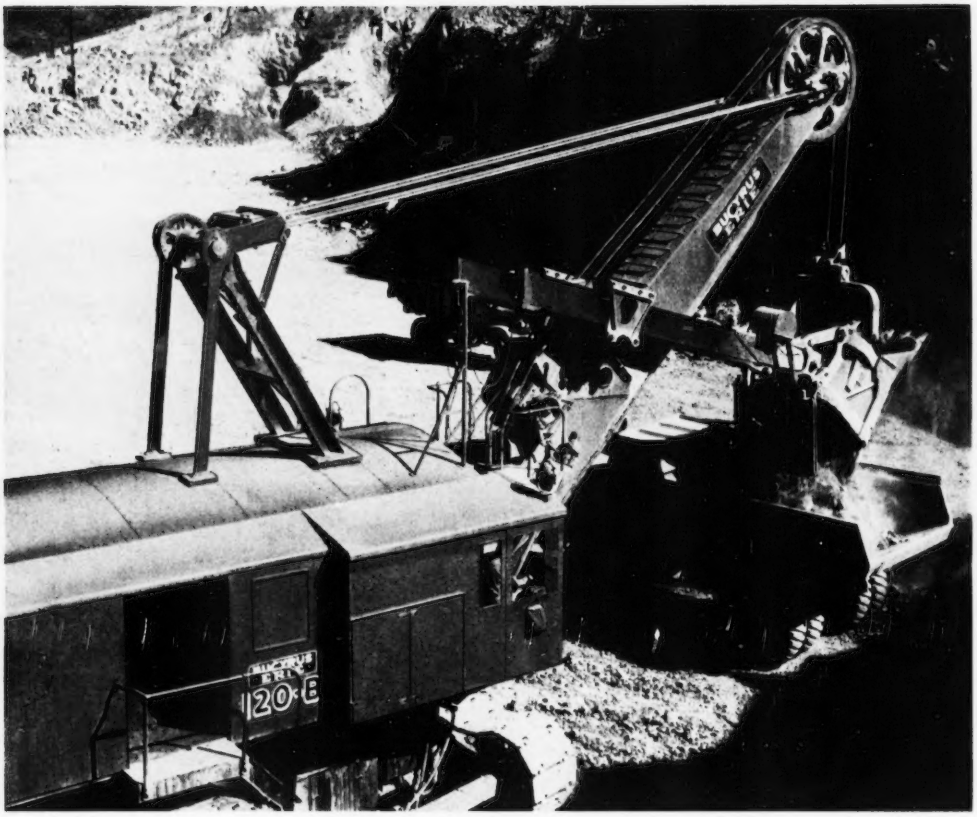

Seven Keys to OUTPUT

Here are seven good reasons why Bucyrus-Erie's 5-cubic yard 120-B gives you big output at low cost:

❶ **PERFECT CONTROL** — Responsive Ward-Leonard variable voltage control makes it easy for the operator to maintain a fast, productive pace throughout the shift.

❷ **BALANCED DESIGN** — Efficient weight placement and balanced speeds and power mean smooth operating action . . . there's no excess weight anywhere to slow cycle time.

❸ **DIGGING FORCE** — Maximum effective digging force is applied to dipper teeth because long upper boom section, big sheaves and single-part hoist give wide angle between line of bail pull and line of backward thrust.

❹ **WIDE RANGE** — 120-B's long range and high lift make it possible to handle wide cuts efficiently, with minimum time lost in moving or loading.

❺ **FAST SWING** — Full-revolving 120-B has twin vertical swing units providing fast acceleration and deceleration for a smooth, speedy swing that steps up output.

❻ **MANEUVERABILITY** — Strong, flexible 120-B mounting provides a firm digging foundation, permits quick moves anywhere in the pit.

❼ **"YEARS AHEAD" ENGINEERING** — The 120-B is designed for years of outstanding service under hard working conditions. Built of carefully selected steels and alloys for strength and durability, 120-B design embodies unequalled world-wide experience in the manufacture of excavating machinery.

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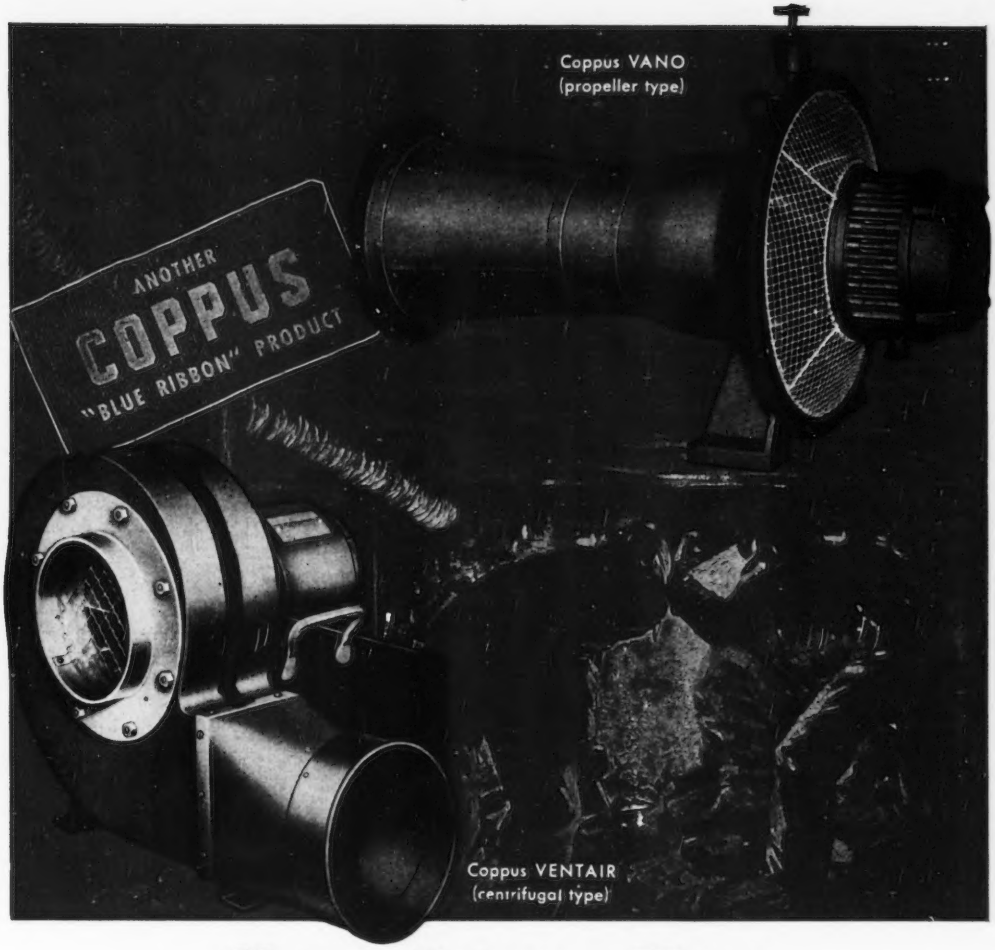

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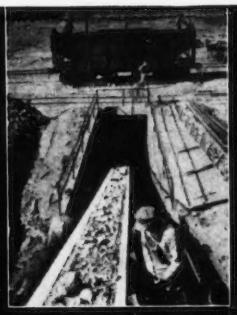
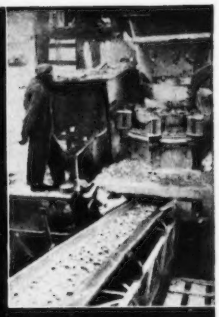

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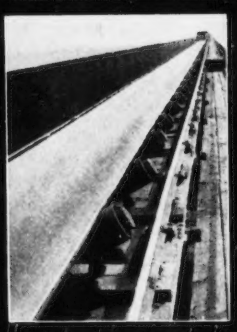
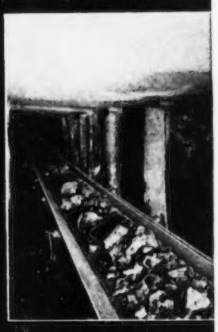

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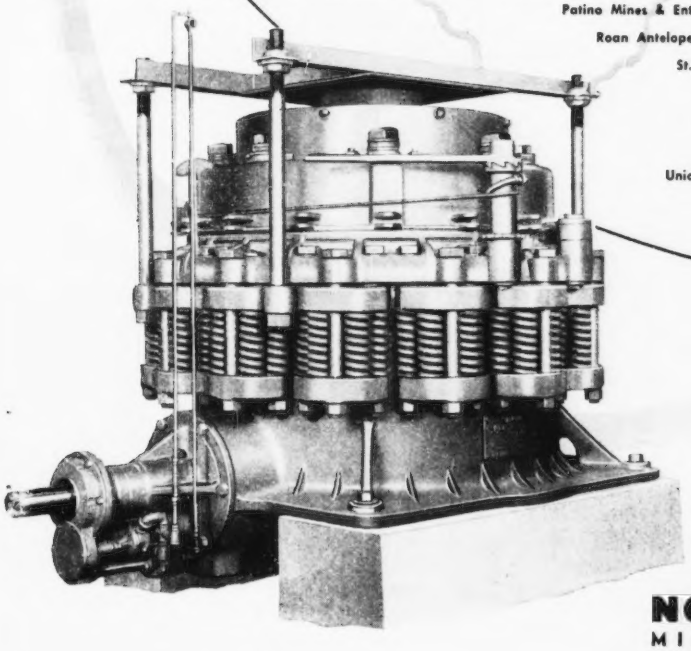

Symons Cone Crushers are available in three types—Standard, Short Head and Intermediate—in a wide range of sizes to fit your requirements. Other Nordberg machinery for the mining industry includes: Primary jaw and gyratory crushers, grinding mills, screens, grizzlies, feeders, hoists and Diesel engines. Write for information on the equipment you need.

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WRITE FOR our illustrated Bulletin 5112 which contains details of the construction, capacity, application and, especially, the efficient crushing principle of Traylor TY Reduction Crushers. Ask for Bulletin 114 on Traylor Feeders, too.

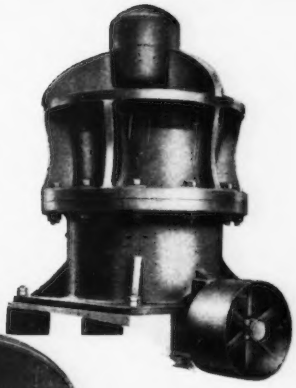
READ THEM both carefully. Study the features that make Traylor crushers and feeders the equipment you want . . . because they are built for maximum efficiency and, therefore . . . truly profitable operation.

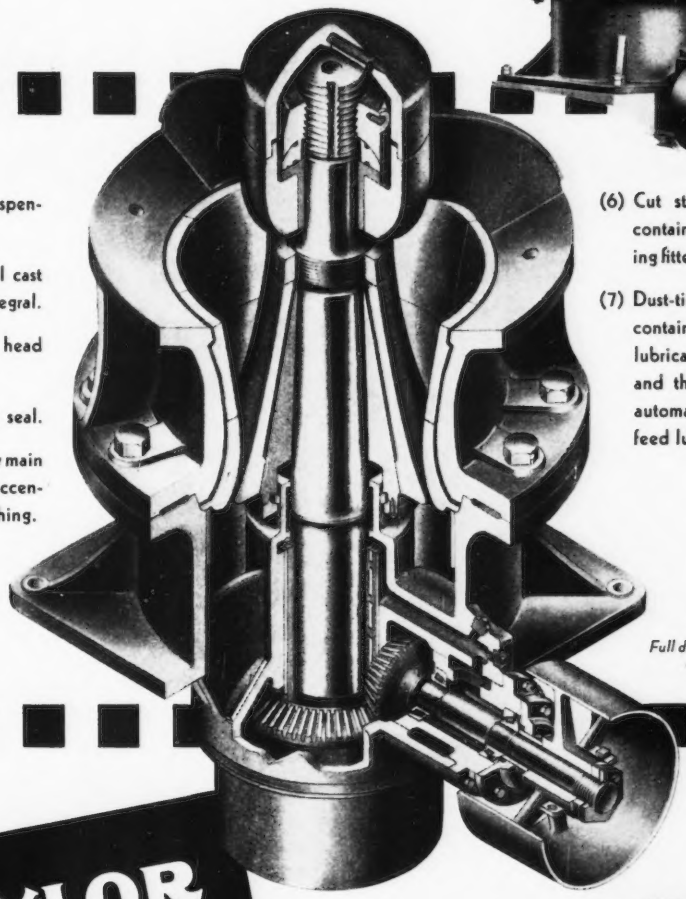
SEND US the information outlined on page 7 of the Crusher Bulletin and receive concise, explicit, expert recommendations for your individual operation.

Can Increase Your Crushing Profits . . . by Reducing Production Costs

A "TRAYLOR" LEADS TO GREATER PROFITS

This Quarter section Cut-away Reveals Many of the Major Features of the Traylor TY Reduction Crushers . . .





(1) Quickly adjustable suspension.

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(3) Efficient Traylor bell head and curved concaves.

(4) Traylor's positive dust seal.

(5) Extra-short, extra-heavy main shaft with full length eccentric and eccentric bushing.

(6) Cut steel gears and self-contained countershaft bearing fitted with roller bearings.

(7) Dust-tight, oil-tight chamber containing the oil reservoir, lubricant cooling system and the heart of the fully automatic, positive force-feed lubrication system.

Full description of these features are in Bulletin 5112

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REDUCTION CRUSHERS · FEEDERS

JAW CRUSHERS · GYRATORY CRUSHERS
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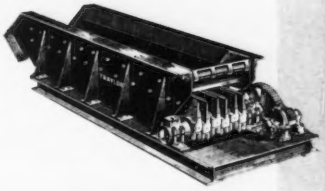
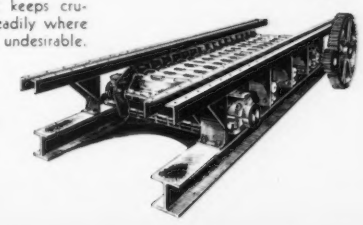
GRINDING MILLS · CRUSHING ROLLS

EVEN FEED GETS THE MOST FROM ANY CRUSHER

This husky TRAYLOR GRIZZLEY FEEDER scalps fines from the feed, carries only oversize to the crusher.



The dependable TRAYLOR APRON FEEDER keeps crushers working steadily where sifting through is undesirable.



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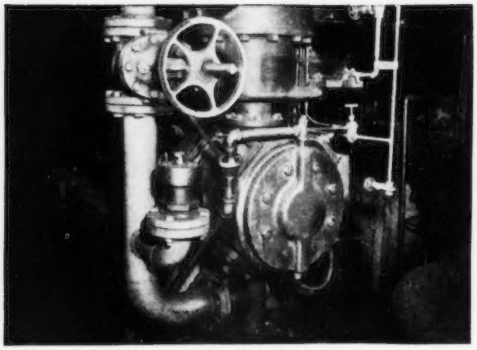
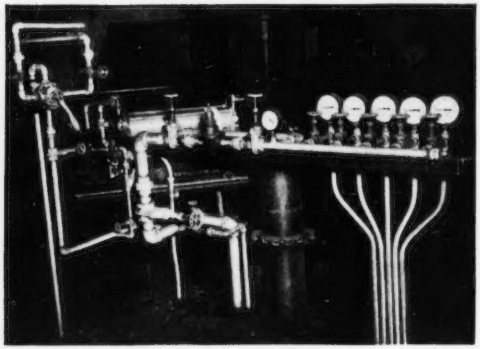


AIR LIFT CONTROL *to secondary cone in coal preparation plant. One order to Crane covers all materials—in brass, iron, steel and alloys—for this type of installation.*



AIR HEADER LINE *from compressors featuring Crane iron body gate valves, clamp gate valves, brass globe valves, and screwed fittings—all from the complete Crane line.*

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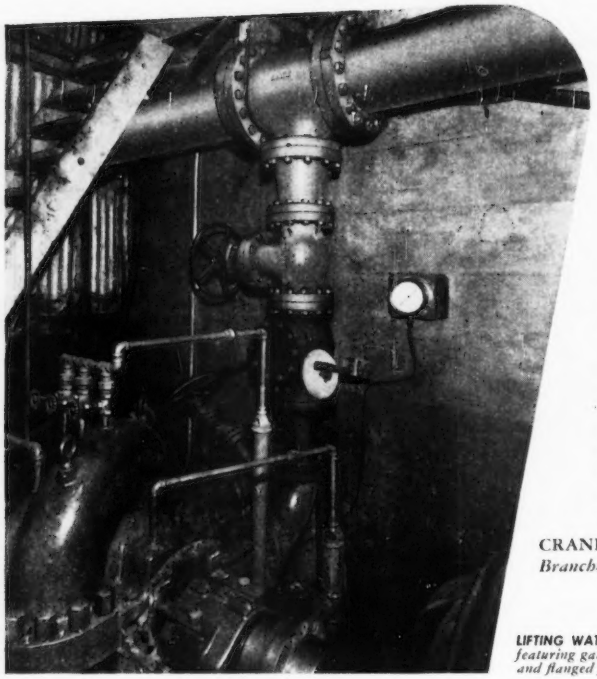

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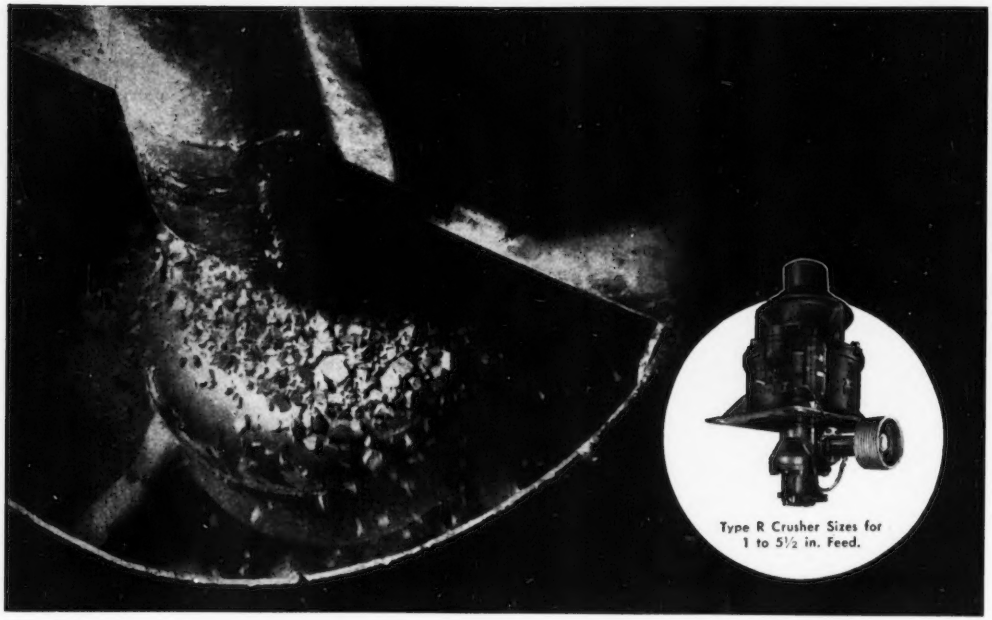

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INSTALLED IN 1940 by Bird and Sons, E. Walpole, Mass., this *Type R* gyratory crusher has been in operation 24 hours most days reducing hard, abrasive trap rock for roofing granules.

Trap rock is tough on crushers. Yet, so little "time out" for maintenance has been required since this machine was installed that these owners say it does a remarkable job for this kind of work.

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Type R crusher gives you maximum crushing capacity. That's due to the scientifically shaped crushing chamber... which also results in a more cubical product.

MAINTAINS EXACT PRODUCT SIZE

It's a topnotcher in operating convenience, too. "Speed-Set" control of crusher setting permits adjustment to exacting product size with turn of hand crank . . . *easily*, without stopping crusher!

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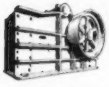
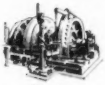

Jaw Crushers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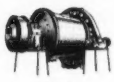
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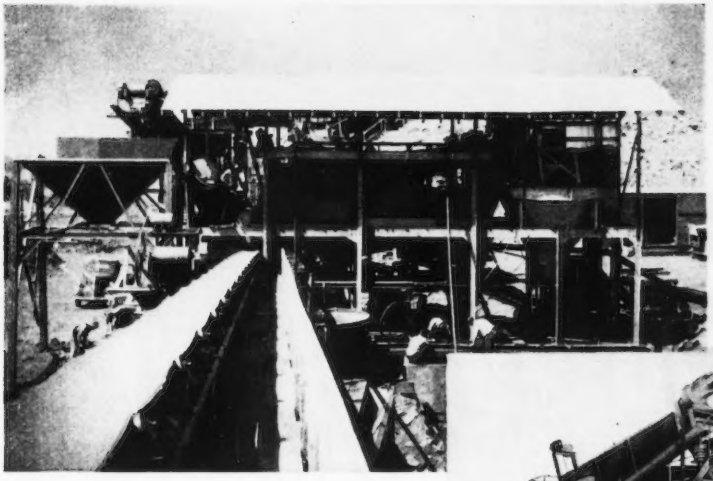

Mobil-Mills are furnished in 4 sizes to treat up to 125 TPH. Larger plants for any tonnage requirement can be supplied in a relatively short period of time.

- For operators who want RESULTS TODAY —with MINIMUM CAPITAL INVESTMENT— the Mobil-Mill offers a sound, simple solution.

- The WKE (HMS) MOBIL-MILL PRODUCTION UNIT can be installed, ready-to-operate in one week after delivery at the job site.

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MORE THAN 10 MILLION TONS PER YEAR (rated capacity) are now being handled by WKE (HMS) Mobil-Mill units. All ores amenable to heavy media separation can be treated by Mobil-Mills. A few of the ores now being treated are

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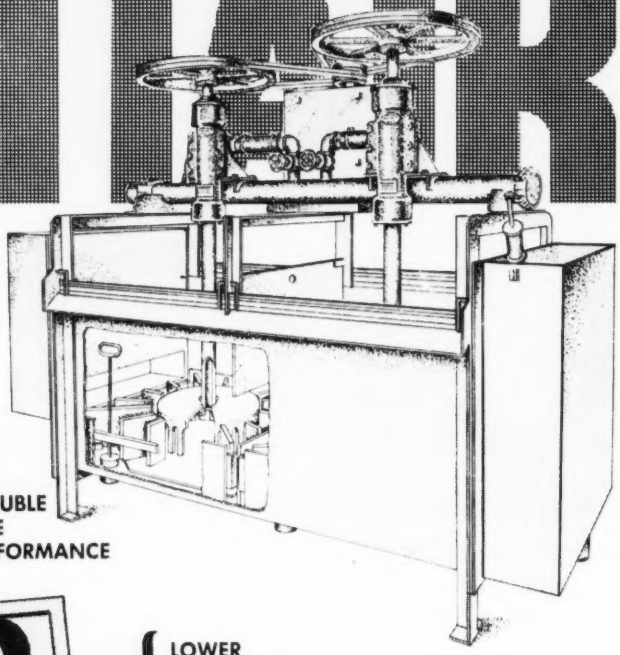
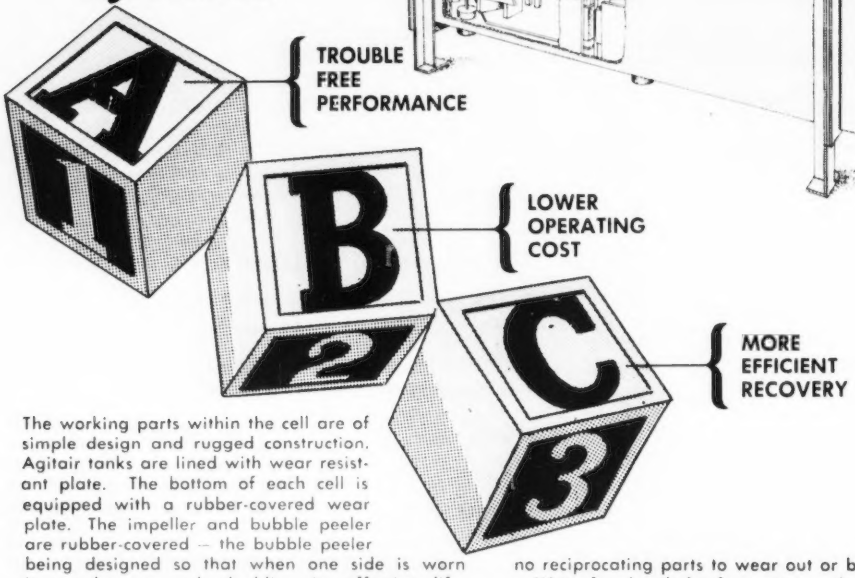


ITS A-B-C simplicity pays big returns



The working parts within the cell are of simple design and rugged construction. Agitair tanks are lined with wear resistant plate. The bottom of each cell is equipped with a rubber-covered wear plate. The impeller and bubble peeler are rubber-covered — the bubble peeler being designed so that when one side is worn it can be reversed, doubling its effective life. The impeller is the only moving part within the cell — making for mechanical simplicity, with no reciprocating parts to wear out or break down.

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On many machines General Electric Geoprene-jacketed cables can produce substantial savings in cable size. Shovels, for example, that used to require a 4/0 Awg conductor, now need only a 2/0 Awg conductor in a Geoprene cable.

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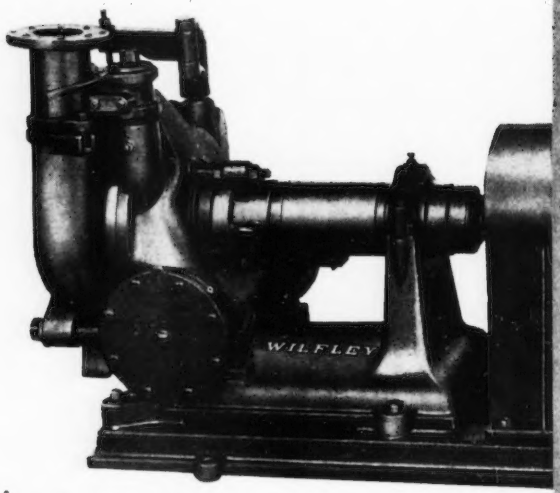

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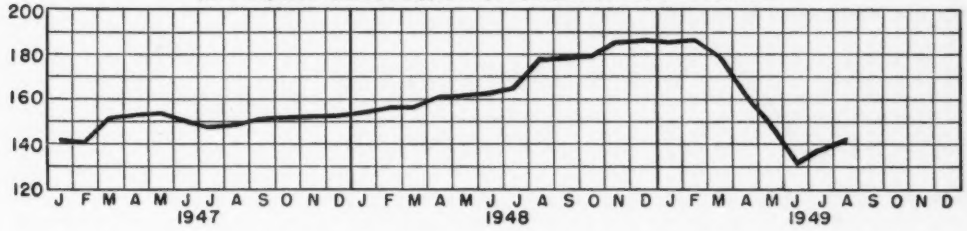
E & M J OUTLOOK

E&MJ Weighted Index of Non-Ferrous Metal Prices

(100 is composite for 1922-3-4 of Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum prices).



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MARKETS

The rise in price index for non-ferrous metals from July's 136.65 to 141.90 in August brings with it a cautious optimism. The influence of a now-we-do-it-now-we-don't stockpiling program, particularly in lead, and the failure of big key industries to duplicate the metal price readjustment, are causing concern. A sellers' market in metals has not returned yet.

Partial decontrol of tin will not open a free market, — at least not until after the Washington financial talks. Meanwhile Britain has shut off exports. Feeling is that U.S. refusal to support tin prices will embarrass Bolivians, Dutch and British. At the same time these exporters regard U.S. tin stockpiles as a sword over their heads. (Metal prices, next page.)

●

LABOR

Metal mining's horizon holds a cloud, no bigger yet than the clenched fist of Communism, but growing rapidly. Maurice Travis, Mine-Mill secretary and No. 1 Party-liner, has renounced the Party (but not Communism), and thereby won NLRB's temporary blessing. Still strong in major units, his union will press for pensions, welfare funds and wage hikes to the point of strikes. Only two or three small locals have bolted the ranks to sign new contracts at the old, or lower, wage rates.

Coming just as non-ferrous demand is picking up, a **long steel strike would hurt metal mining.** A steel wage or "benefit" increase would hurt too, with mining costs still near or above income for many operators.

●

AT HOME

High-cost operations, in danger of permanent loss of reserves through low metal prices, came the closest yet to getting a lift from Government. Senator O'Mahoney and Interior Dept. experts drew up a hurried mine incentive bill recently, got Administration approval, and ran it through committee to the Senate floor. The bill (S. 2105) looked like a good bet until it picked up some broadening amendments in committee. Even if it passes the Senate it faces a veto. (See Washington Reflections, p. 98).

Secretary of the Treasury, John W. Snyder, still intends to fight an **increased gold price.** Pressure from Britain and elsewhere will be strong, but the Treasury and the International Monetary Fund seem stronger.

●

ABROAD

Britain's hopes to improve its dollar status through U.S. purchases of strategic materials were jolted by the Senate's slash at long term stockpiling deals . . . **Australia** will turn uranium mining over to private enterprise and encourage prospecting by setting up a definite market for ore and concentrates . . . **Yugoslavia** has delivered a 6,000-ton lead and 1,700-ton copper cargo to New York, with more to come. This trade shift should have little effect in U.S., but will disturb Iron Curtain economy where these metals are in short supply.

MARKETS—Trends and Prices

Lead Advances to 15⅛c., New York, on Heavy Sales—Copper Deliveries Increasing—Tin Controls Eased

PRICE ADVANCES in major non-ferrous metals that occurred in July were extended during August in lead and fully maintained in both copper and zinc. Foreign silver came in for increased attention from consumers and the price advanced 1½c. an ounce, the first revision in the quotation since Feb. 15, 1949. Controls on use of tin were eliminated. Demand for metals was fairly active. When the August statistics become available it is highly probable that stocks of copper and lead in the hands of producers will show a drop, compared with recent months. Zinc production, some observers believe, will have to be reduced to balance supply and demand. Stockpile buying of lead continued, with the purchases extending to the end of the year. Domestic copper also figured in the month's stockpile transactions, but the tonnages involved were small compared with lead.

The outlook for non-ferrous metals became somewhat confused as the month ended because of strikes and the threat of strikes. The work stoppage at the Carteret refinery of the American Metal Co., now in its second month, reduced the supply of refined copper and embarrassed consumers who had contracted for special shapes. The smelter and mines of Bunker Hill (Idaho) were shut down because of disagreement over health and welfare demands by labor. Workers at smelters and refineries of Phelps Dodge and the American Smelting & Refining Co. voted to "authorize" strikes. There was strong suspicion that current labor unrest at non-ferrous metal operations is tied in with the demands of workers in the steel industry.

In connection with the forthcoming meeting in Washington on Great Britain's dollar crisis, it was felt that gold will be a topic for at least informal discussion. Secretary of the Treasury Snyder has gone on record as being opposed to disturbing the price of gold.

Higher monthly averages for copper, lead, zinc and silver brought another upturn in our weighted index of non-ferrous metal prices. The index for August moved up to 141.90, against 136.65 in July and the low for the year of 131.20 in June. Averages for tin, aluminum and nickel remained unchanged.

The Federal Reserve Board's index of industrial production declined in July to 162, seven points below June. The Board observed that preliminary data for August points to a recovery in general industrial activity to the June level. Both steel and automobile production averaged higher in August than in the preceding month.

Production of steel in the United States as August ended was at the rate of 86.3% of capacity, which compares with 81.3% at the beginning of the month. Production of steel ingots and castings averaged somewhat higher than 1,500,000 tons a week.

Copper Deliveries Up

Based on sales to consumers, deliveries of refined copper in this country should total around 80,000 tons in August, which compares with 45,316 tons in July (the vacation month), and 45,653 tons in June. Improved buying of copper has been reflected in a firmer undertone, but there was no move to raise the price above 17⅝c., Connecticut Valley. Whether a 3.7% rise in freight rates, effective Sept. 1, will be absorbed by producers was not clear.

Deliveries of refined copper to fabricators, and shipments of copper to customers of the fabricating plants in the Jan.-July period compare as follows, figures in tons:

	Deliveries to Fabricators	Fabricator's Shipments
January	94,070	109,551
February	97,861	93,474
March	113,154	89,834
April	76,134	65,461
May	32,566	61,383
June	45,653	71,124
July	45,316	60,823

Stocks of refined copper in the hands of producers in this country have increased from 91,053 tons at the end of January to 212,817 tons at the end of July. The gain in stocks was not particularly disturbing because the increased holdings appeared to be in strong hands. Fabricators' stocks decreased from 364,656 tons at the end of January to 325,806 tons at the end of July.

Testimony before the Senate Finance Committee on the re-imposition of the 2c. import duty on copper, heard early in the month, revealed that the strictly domestic mine operators, as expected, were strongly in favor of the tax and custom smelters and consumers opposed a change under prevailing circumstances. The net result, it is believed in market circles, will be to continue the suspension until it dies a natural death on June 30, 1950.

Lead at 15⅛c., N. Y.

The volume of business placed in lead was substantial, both for consumption here and for the stockpile. This caused the price to rise from 14½c. to 15⅛c., New York, early in the month. For a time the St. Louis basis was below parity with New York, which grew out of a difference of opinion on prices among major sellers. On August 15 the two quotations again were brought into line as demands continued exceptionally heavy. Consumers feared that the supply situation would become acute, but they soon learned that producers were ready to offer the metal freely as prices advanced. Lead was accumulated by some producers on the decline that they refused to sell at a loss.

The strike at Bunker Hill, unless settled soon, will result in a loss of some 5,000 tons of lead a month. Against this possibility the industry got comfort out of the announcement that the Herculaneum smelter of St. Joseph Lead, down for repairs for the summer, has been placed in operation.

Wide publicity was given in the press on the arrival of about 6,000 tons of lead from Yugoslavia, the largest shipment from that country

Average Prices for August (E&MJ Quotations)

Copper:	
Electrolytic, Domestic Refinery	17.325
Electrolytic, Export, Refinery	17.551
Lead:	
Common, New York	15.032
Common, St. Louis	14.791
Silver and Sterling Exchange:	
Silver, New York, per oz.	71.891
Silver, London, pence per oz.	43.727
Sterling Exchange, "Checks"	402.522
Zinc:	
Prime Western, East St. Louis	10.000
Tin:	
New York, Straits	103.000
New York, 99% min. (e)	102.000
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$74.556
Antimony, (E.&M.J.) (d)	41.730
Antimony, bulk, Laredo	38.500
Antimony, in cases, Laredo	39.000
Platinum, Refined, per oz.	$69.000
Cadmium, (a)	200.000
Cadmium (b)	207.500
Cadmium (c)	215.000
Aluminum, 99% plus, ingot	17.000
Magnesium, ingot	20.500
Nickel (f)	40.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange, checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin contained.

(f) F. o. b. Port Colborne, U. S. duty included.

so far this year. All of this had been sold before arrival. Late in August lead from European sources was offered here for future arrival at prices ranging from 14½c. to 14⅝c., duty paid, New York.

Mexican lead was offered at 14⅝c., f.a.s. Gulf ports.

Prime Western zinc was firm throughout August at 10c. per pound, East St. Louis.

Limitations on the use of tin and the ban on private importation of the metal were lifted on August 26 by the Office of Domestic Commerce in an amended version of allocations order M-43.

In modifying the wartime tin orders, it was said that the move is in line with the Government's policy of decontrolling tin as soon as supplies become large enough to meet the needs of industry and of the strategic stockpile. The general framework of order M-43 has been retained.

Controls still in force include:

1 — Allocation of all pig tin.

2 — Inventory controls on pig tin and all materials containing tin.

3 — Reports by holders, distributors, importers and users of tin.

4 — Import controls on pig tin and materials containing tin.

Following this announcement, operators here in a position to obtain cheap pounds purchased tin in Malaya at a discount of 3 to 5c. per pound under the $1.03 basis for Grade A. As soon as the British authorities learned of this development they withdrew all offerings. The sale of tin through exchange manipulation at this critical period was viewed as highly objectionable by the Ministry of Supply.

(*Continued on page* 97)

Major Metals

U. S. DAILY AND AVERAGE PRICES

Aug. 1949	Electrolytic Domestic (a)	Copper Export (b)	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	17.325	17.550	103.000	14.500	14.300	10.000
2	17.325	17.550	103.000	14.750	14.550	10.000
3	17.325	17.550	103.000	14.750	14.550	10.000
4	17.325	17.550	103.000	14.750	14.550	10.000
5	17.325	17.550	103.000	14.750	14.550	10.000
6	No Market	17.550	103.000	14.750	14.550	10.000
8	17.325	17.550	103.000	15.125	14.800	10.000
9	17.325	17.550	103.000	15.125	14.800	10.000
10	17.325	17.575	103.000	15.125	14.800	10.000
11	17.325	17.550	103.000	15.125	14.800	10.000
12	17.325	17.550	103.000	15.125	14.800	10.000
13	No Market	17.550	103.000	15.125	14.800	10.000
15	17.325	17.550	103.000	15.125	14.800	10.000
16	17.325	17.550	103.000	15.125	14.800	10.000
17.	17.325	17.550	103.000	15.125	14.800	10.000
18	17.325	17.550	103.000	15.125	14.925	10.000
19	17.325	17.550	103.000	15.125	14.925	10.000
20	No Market	17.550	103.000	15.125	14.925	10.000
22	17.325	17.550	103.000	15.125	14.925	10.000
23	17.325	17.550	103.000	15.125	14.925	10.000
24	17.325	17.550	103.000	15.125	14.925	10.000
25	17.325	17.550	103.000	15.125	14.925	10.000
26	17.325	17.550	103.000	15.125	14.925	10.000
27	No Market	17.550	103.000	15.125	14.925	10.000
29	17.325	17.550	103.000	15.125	14.925	10.000
30	17.325	17.550	103.000	15.125	14.925	10.000
31	17.325	17.550	103.000	15.125	14.925	10.000
AVERAGES FOR MONTH						
Aug.	17.325	17.551	103.000	15.032	14.791	10.000
AVERAGES FOR WEEK						
Aug.						
3	17.325	17.550	103.000	14.583	14.383	10.000
10	17.325	17.554	103.000	14.938	14.675	10.000
17	17.325	17.550	103.000	15.125	14.800	10.000
24	17.325	17.550	103.000	15.125	14.925	10.000
31	17.325	17.550	103.000	15.125	14.925	10.000
CALENDAR WEEK AVERAGES						
Aug.						
6	17.325	17.550	103.000	14.708	14.508	10.000
13	17.325	17.554	103.000	15.125	14.800	10.000
20	17.325	17.550	103.000	15.125	14.863	10.000
27	17.325	17.550	103.000	15.125	14.925	10.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Aug. 1949	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	402.500	71.500	Holiday	Holiday	$35.00
2	402.500	71.500	43.500d.	172s. 3d.	35.00
3	402.750	71.500	43.500d.	172s. 3d.	35.00
4	402.500	71.500	43.500d.	172s. 3d.	35.00
5	402.500	71.500	43.500d.	172s. 3d.	35.00
6	*(e)*	*(e)*	*(e)*	*(e)*	35.00
8	402.500	71.500	43.500d.	172s. 3d.	35.00
9	402.500	71.500	43.500d.	172s. 3d.	35.00
10	402.500	71.500	43.500d.	172s. 3d.	35.00
11	402.500	71.500	43.500d.	172s. 3d.	35.00
12	402.500	71.500	43.500d.	172s. 3d.	35.00
13	*(e)*	*(e)*	*(e)*	*(e)*	35.00
15	402.750	71.500	43.500d.	172s. 3d.	35.00
16	402.500	71.500	43.500d.	172s. 3d.	35.00
17	402.500	71.500	43.500d.	172s. 3d.	35.00
18	402.500	71.500	43.500d.	172s. 3d.	35.00
19	402.500	71.500	43.500d.	172s. 3d.	35.00
20	*(e)*	*(e)*	*(e)*	*(e)*	35.00
22	402.500	71.500	43.500d.	172s. 3d.	35.00
23	402.500	72.000	43.500d.	172s. 3d.	35.00
24	402.500	72.500	44.000d.	172s. 3d.	35.00
25	402.500	73.000	44.000d.	172s. 3d.	35.00
26	402.500	73.000	44.500d.	172s. 3d.	35.00
27	*(e)*	*(e)*	*(e)*	*(e)*	35.00
29	402.500	73.000	44.500d.	172s. 3d.	35.00
30	402.500	73.000	44.500d.	172s. 3d.	35.00
31	402.500	73.000	44.500d.	172s. 3d.	35.00
AVERAGES FOR MONTH					
Aug.	402.522	71.891	43.727d.	—	35.00
AVERAGES FOR WEEK					
Aug.					
3	402.550	71.500	—	—	
10	402.500	71.500	—	—	
17	402.550	71.500	—	—	
24	402.500	71.800	—	—	
31	402.500	73.000	—	—	

Calendar week averages, New York Silver: Aug. 6th, 71.500; 13th, 71.500; 20th, 71.500; 27th, 72.400.

(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade and Special High Grade zinc delivered in the East and Middle West command a premium of 1c. per pound over the current market for the Prime Western.

Quotations for lead are for common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and one-eighth cent fractions per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, dilivering, and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By-Lines . . .

We got our feet wet this month, probing the muddy waters of the stockpiling situation (page 72). The list of people **Bob Ramsey** talked to in getting the mining side of the story would make a veritable "Who's Who in Stockpiling." However, you can see for yourself that his valiant efforts in piercing the outer guard of such strongholds as the ECA, Department of the Interior, and the Pentagon reaped ample reward. He spoke to Senators, Army Generals, Navy Captains, Governmentexperts, and the ever-present, Usually-Reliable-Sources, to obtain background for this informative article. It's all yours and without the 5%, too.

On page 75 you will find a thought-provoking article on the problem of carbon monoxide in the mines. Most emphatically it merits your attention, for it discusses a dangerous situation of which many are unaware.

R. W. Thompkins, the author, is a man well qualified to discuss any phase of mine ventilation. Besides working for six Kirkland Lake mines on a permanent basis, he is a ventilation consultant for a number of other mines, including Eldorado Mining and Refining, Buchans Mining Co., and East Malartic Gold mines. Since his graduation from Queen's University, Ontario, with a B. Sc. degree in 1933, he has worked at almost every kind of engineering job pertaining to mining.

Despite a heavy schedule, Mr. Thompkins finds time for an occasional romp with his eight-year old daughter and his six-year old son, and for an active community life. He is a member of the Association of Professional Engineers of Ontario; a past governor of the Association of Kinsmen Clubs of Canada, a service group; and as secretary-treasurer of the Kirkland Lake Liberal Association, he keeps abreast of politics.

Now that we are on somewhat more friendly terms with the Sons of Nippon than we were four or five years ago, we don't mind them taking a leaf from our book occasionally. In case your Japanese is a little rusty, the characters below, from the cover of *Bulletin of Japan Mining Industry Association*, say "New Time Study Methods Expose Mining Bottlenecks . . . 20."

珠鐵作業の臨路調査の爲の
新しいタイム・スタディ法
A ウエイン・ビトナー
デイヴイツド.R.ミッチエル 20

The article appeared in the January, 1949, issue of *E&MJ*. If you missed reading it in clear, precise English, we have a copy available should you care to tackle it in clear, precise Japanese.

Here is one for geologists; can you find ore in a given area by merely studying the topography? In a few columns of text, entirely surrounded by maps (page 90), **Elmer V. Reinhardt** says "Yes," and offers some substantial arguments in support of his stand. We predict a goodly number of pros and cons.

As you have no doubt noted, the *E&MJ* deck was reshuffled this month and another card added. *E&MJ* Outlook will present the last minute news, hot off the wire, as the saying goes, and what it may mean to the mining industry; sort of a Gabriel Heatter in a hard hat.

In News of the Industry we are passing along a note on how the U. S. Employment Service will aid employers in devising aptitude tests for job applicants. Getting the right man in the right job saves not only the cost of training programs, but minimizes the safety problem and helps prevent production snarls because of inaptitude on the part of the worker. It is something to consider in cost reduction.

We eventually got used to having the local department store bill come in each month reeking of "My Sin" or some other equally inflaming perfume, but an advertisement for Geiger counters coming to us impregnated with carnotite really made us sit up and take our feet off the desk. The idea we think is pretty clever. The folded card, advertising Midwest Electronic Laboratories counters, contains just enough radioactive ore to give 750 counts per minute on any of the company's units and can thus be used as a test card. In case you're interested, Midwest's address is 636 Keeline Building, Omaha, Nebraska.

And the gentlemen of fashion among the mining fraternity will be glad to learn that they can now purchase pocket Geiger counters along with their fur-lined cravats and patent leather dancing slippers at Abercrombie & Fitch, the swank men's store. The pocket counter, referred to as "the Sniffer," is made by Radiac Co. of New York.

A tree grows in Bunker Hill and Sullivan that is in many ways more phenomenal than its notorious fellow tree in Brooklyn. First of all, the Idaho tree, pictured here, is a lemon tree, and secondly, it literally has never seen the light of day. Apparently a miner eating his lunch or mixing a Tom Collins deep in the Bunker Hill workings one day inadvertently dropped a lemon seed. The darn thing sprouted and has been thriving ever since, except for a brief period when some of the boys thoughtfully tried to encourage growth with an ultraviolet lamp. Up to now they have had to transplant this anti-solar tree from a coffee tin to powder box to a nail keg.

ENGINEERING AND MINING JOURNAL

SEPTEMBER, 1949

The Fight Goes On

WITH OBVIOUS bitterness, and perhaps some apprehension, the left-wing leadership of the Mine, Mill and Smelter Workers union has yielded to the law of the land and has signed the non-Communist affidavits required to be filed with the National Labor Relations Board before a union can achieve recognition in dealings with the Board or with employers.

This means first, that the Mine-Mill officers are liable to stiff penalties for perjury if it is found that these affidavits were sworn to falsely; and second, the ball is now passed to those employers who refused to deal with a union whose officers were not in compliance with the law. It does not mean that the left-wingers are any less strong in Mine, Mill. Nor does it mean that the Mine-Mill union is any the less under the dominance of the Soviet type of mind. On the contrary, the fight to rid this union of its Communist control is only well begun.

From the side of management, the left-wingers have been under fire in that a determined employer could refuse to bargain with a "non-complying" union. Beginning with Paul Hunt of Park Utah Mining Co. over a year ago, many mining employers have so refused. Most indomitable in resistance to the leftists has been Howard Young, president of American Zinc, Lead and Smelting Co., whose steadfast refusal to bargain with the Soviet sympathizers finally forced the union leaders to sign the non-Communist oath.

It would be naive, of course, to believe that Mine, Mill's leaders have changed their views in the least. They signed the affidavits because they had to in order to save their crumbling union from final collapse. Defeated in one strike or election after another, and under attack from other complying CIO unions, Mine, Mill had to get the legal recognition of the NLRB or bow out.

The Board has accepted Mine, Mill's affidavits at their face value. Only the Department of Justice can or will question their validity. Therefore, barring some action by the FBI, it appears that Mine, Mill will be represented in plant elections, and will be able to regain the bargaining status that it has lost this past year.

Therefore, mining employers, at those properties where Mine, Mill still holds a majority, must face once more the daily battle of wits with the left-wing troublemakers. As never before, management must be wise, strong, and forthright, because the battle, though it may be well advanced, will be tougher from here on in. Communist influence in metal mining must be wiped out. All honor to those, like Howard Young, who have helped the industry so strongly toward this goal.

Don't Minimize the CO Hazard

A CAREFUL study of R. W. Thompkins' article on carbon monoxide occurrences in metal mines, p. 76, suggests the point that mine operators should be on the constant lookout for this treacherous gas. The so-called powder headache resulting from breathing air contaminated with powder smoke or gases released from muck piles may be caused by CO as well as other products of combustion. If sprays are used after blasting, they will generally remove soluble gases such as CO_2. But CO is virtually insoluble and hence may remain entrapped in the muck pile or rise and collect in pockets not blown out by proper ventilation.

Potential sources of CO are blasting, diesel engines underground, mine fires, burning fuse, and even air compressors, operated under improper conditions. Only a few hundredths of a percent of CO in the mine atmosphere can be dangerous. Hence detection of this gas should become a routine safety measure. Simple instruments are available which enable even an inexperienced operator to detect the presence of CO in concentrations as low as 0.001% by volume. If the gas is present, a little more attention to auxiliary ventilation systems in potentially dangerous areas will solve the problem.

Senator Thomas' slash at stockpile funds . . . . . .

ELMER THOMAS
Senator from Oklahoma

14 MILITARY FUNCTIONS APPROPRIATION ACT, 1950

The committee unanimously agreed that all strategic minerals and materials which are produced in the United States should be purchased here, rather than from foreign sources. The committee was informed that recently a contract was signed between this Government and a foreign company, in which we undertake to buy thousands of tons of copper over a 5-year period. This is taking place at a time when our own mines are closing for lack of a market. The committee recognizes that certain minerals or materials are not produced in this country and has no objection to the foreign purchase of these.

The committee directs that the Munitions Board exhaust every possibility of securing the needed minerals and materials in the United States, before looking to foreign sources. The committee further directs that any foreign contracts entered into in the future should be for a short term and should contain language to allow such contracts to be canceled, if that becomes necessary.

Section 702, a new section in the bill, provides for a reduction of $433,968,611 in the appropriations made in titles II, III, IV, and V of the act and directs the Secretary of Defense to determine which of such appropriation items should be reduced, the reductions to be certified to the Secretary of the Treasury, the Director of the Bureau of the Budget, and the Committees on Appropriations of the Senate and the House of Representatives. The reductions are to be made in

ANXIOUS TO CUT about a billion dollars out of the House's bill of appropriations for the Armed Services for fiscal 1950, Senator Thomas (Dem., Okla.), member of the Senate Appropriations Committee, investigated the Munitions Board's budget for stockpiling. He blew up over items like huge purchases of castor oil (helps make nylon) and pepper (makes Army "C" rations palatable). Long-term, fixed-price contracts to foreign producers also angered him. Result was Committee "directive" reproduced in part above.

Brought quick retorts like these

LOUIS JOHNSON
Secretary of Defense

would come at a time when materials are becoming increasingly available. It would appear wise from the point of view of the national security to achieve the maximum possible progress in stockpiling now while the opportunity presents itself. Moreover, the stockpile is not a current expenditure in the ordinary sense, inasmuch as it is an investment in tangible property with a continuing value.

Accordingly, I urge the reconsideration of the recommended reduction in the stockpile appropriation, and the modification of Senate Report No. 745.

With warm personal regards,

Sincerely yours,

Louis Johnson

Honorable Elmer Thomas

United States Senate

STYMIED by Thomas' strictures until Congress could act, Munitions Board called for help. Louis Johnson's letter (extract above) pointed out at length need for foreign buying, long-term contracts to build stockpiles properly. He asked Senator Thomas to reconsider.

The Snarl In Stockpiling Means Trouble For You

R. H. RAMSEY
Acting Editor

ROAD BLOCKS of the sort pictured on these pages could continue indefinitely to delay, or to misdirect, accumulation of strategic and critical materials for the national stockpile. The whole operation of stockpiling, including both objectives and technique, needs clear restatement and realignment by Congress if anything constructive is to be accomplished and permanent damage to industry avoided.

To begin with, the question of why the stockpile is being built up should be settled clearly and firmly. At the moment it doesn't seem to be. For example, Senator Thomas told an *E&MJ* staff member in August that "it is silly to kill ourselves with stockpiling when there is no war in sight."

Unfortunately, of course, by the time a modern war is in sight, it is coming at you at about 1,800 m.p.h. and it is much too late then to begin stockpiling. The idea behind a stockpile of essential materials is to help avoid a war, or to help survive if war becomes inevitable.

In the mining industry at least, we have found no disagreement with the idea that stockpiles should be built up of those strategic materials that the United States cannot, or does not, produce in quantity. The differences of opinion crop up when one comes to those materials that this country does produce, but only in quantities that may or may not be sufficient to support a war if outside sources were cut off.

It is clear that when it comes to purchase of materials that are produced in this country, the Munitions Board faces a terrific problem. Try as it will, the Board cannot avoid exerting strong influence on metal markets. The mere existence of a willingness on the part of the Government to stockpile copper, lead, or zinc can actively affect prices. This stockpile pressure, within the last few months, has been exerted upward, then downward, then upward again. For the sake of peace and progress in the mining industry, this market reflection of stockpiling policy ought to be minimized. Closer cooperation with industry seems the only logical solution to this problem.

This does not mean, however, that the Munitions Board should be used to support or to subsidize the domestic mining industry. The Board's present staff does want definitely to keep clear of any mine subsidy program. They feel, and rightly, that if they were required to buy, willy-nilly, all the metal that might be produced under subsidies, their purchasing programs would get even farther out of balance than they are now. Also, their appropriations might be used up in buying metal they don't need, perhaps preventing them from buying other and more essential commodities.

Their hopes may, however, be

Photos by Wide World

JULIUS A. KRUG
Secretary of Interior

Board and the General Services Administration in accomplishing the purposes of the stockpiling law.

In my capacity as advisor on stockpiling policy, I have pointed out repeatedly to the procuring authorities that in certain commodity categories where materials are in short supply, following the satisfying of world demand it would be absolutely necessary to enter into long-term contracts with proposed producers in order to insure development of new strategic material sources for supplying the stockpile needs. There are at the present time a number of scarce items which the procuring authorities are unable to obtain in sufficient quantity to meet stockpile goals; these goals cannot be attained in a reasonable length of time unless new sources are developed.

I am certain that the National Military Establishment has discussed with you the strategic importance of these stockpiles in some detail, but I should like to emphasize from my own experience that the question is a matter of deep national concern. I urge that this particular language be removed and that the $275,000,000 for contract authority as previously recommended for this purpose be restored.

Sincerely yours,

Hon. Elmer Thomas
United States Senate

/s/ J. A. KRUG
Secretary of the Interior

RECONSIDERATION of Thomas report was asked by Krug and other Administration officials, pointing out essentiality of long-term contractual authority for the Munitions Board's programs and need for new sources of supply. Senator Thomas' answer, a flat "No."

in vain. President Truman told a group of Western Congressmen in July that he was strongly opposed to any sort of peacetime subsidy for the mining industry. He went on to say that the Munitions Board purchases ought to be sufficient to keep in operation those mines that deserved it, and that he could, by directive, have the Munitions Board formulate its policies to do that. He implied, however, that he was against the use by the Board of incentive prices for metals in order to keep marginal mines in operation.

Building Stockpiles

The Munitions Board is supposed to plan for each six-month period what its purchase objectives will be with regard to the 69 commodities which it considers at present to be strategic or critical. These estimates are based on the advice of the Strategic Materials Committee, made up of representatives of the Departments of State, Treasury, Commerce, Agriculture, Interior, the National Security Resources Board, the National Military Establishment, and the Economic Cooperation Administration.

When this formidable group has determined the quantity and quality of material to be stockpiled, the Munitions Board turns over actual purchasing job to the Bureau of Federal Supply. The BFS negotiates the contracts, subject to the review and approval of the Munitions Board.

In all purchases, the Munitions Board must balance its expenditures against both its appropriation and its shifting schedule of needs for materials. It tries to keep purchases in balance, so that it won't be too long on mercury and too short on cobalt, for example. This calls for superhuman foresight and an unlimited budget, neither of which is available to the Board.

Past Performance

As might be expected, the stockpilers have never achieved that nice balance of purchases at lowest cost, with minimum dislocation of the civilian market. Yet if they can be criticized for anything, it is for over-caution in seeking to buy some items, and prodigality in buying of others.

In copper, for example, long-term contracts have been given to some producers and have been denied to others. Some of these contracts have even carried both price floors and price ceilings, although the usual practice of the BFS is to specify the *E&MJ* previous month's average as the basis for payment. Senator Thomas, as well as a number of industry members, have been particularly upset by these fixed-price contracts.

In September, 1948, the Board approved three five-year contracts with Canadian producers for substantial tonnages of copper. Hearing as they did on all sides the predictions that metal prices were heading for new and higher plateaus (predictions in which this magazine did not join), the Munitions Board wrote price ceilings of 23½c. per lb. into these contracts. The producers in turn asked for price floors of 18c. per lb., which were granted. No one in the copper industry, buying metal, would have written such a contract for that long a term, but it must be remembered that the Munitions Board and the Bureau of Federal Supply are not in the copper business.

Fixed-Price Contracts

One more such copper contract, this one with a domestic producer, was made in February, 1949. Three lead contracts, running for five years and specifying firm prices, were also written last winter, one of them with a domestic producer.

Seven more long-term, fixed-price contracts have been written to assist in production development. These allow amortization during the life of the contract of the expenses of expanding metal production. They specify a firm price, usually for the first two years, then call for payment at the current market during the rest of the term. Most of these contracts are with Western Hemisphere producers.

All other long-term contracts (there are 2,005 in all) specify payment at the market, as previously noted. As of June 30, 1949, there were outstanding obligations of $201,000,000 in long-term contracts (more than a year), and $157,000,000 in medium-term contracts (six months to one year).

This matter of long-term contracts holds much of the answer to stockpiling's future. If the major part of its purchases are made on this basis, the Munitions Board's contracts will have a generally supporting effect on metal markets. But it is unlikely that such contracts could become so strong a market influence as would stockpiling run on a spot or nearby basis.

At present, the Munitions Board might well echo the darky preacher who explained the phrase, *status quo*, by saying that it was "the Latin expression for the mess we is in."

Senate Steps In

Some months ago, the House sent up to the Senate the Armed Forces Appropriation bill (H.R. 4146) and it went before Senator MacKellar's Appropriations Committee. As the Senator from Oklahoma leafed through the bill, he came to the section covering proposed expenditures for stockpiling. These seemed much too large to him, and on investigating he found many proposals that shocked him.

Senator Thomas found, for example, that the Munitions Board had already bought 15,000,000 lb. of castor oil and wanted "trainloads" more. The Board had only 200,000 lb. of pepper and wanted to buy 24,000,000 lb. Other odds and ends reported by the Senator were that the stockpile included a four years' supply of antimony, but only one year's supply of zinc and tin. He said the Board wants to buy 230,000 tons of lead and had only 90,000 tons on hand. It has a 20-year supply of zirconium and a five years' supply of quinine. All in all, he said, the stockpile represents a billion-dollar investment, which the Munitions Board plans to expand to $3½ billions. The Senator doesn't intend to let them.

First, Senator Thomas hopes to convince someone in authority that the Munitions Board ought to cut its objectives back from an average of a five-years' supply to a one-year supply of each commodity. This would, of course, halt stockpiling for many of the major items, such as copper, tin, zinc, antimony, and others.

Second, Senator MacKellar's Committee report on H.R. 4146 "directs" that the Munitions Board "exhaust every possibility" of getting needed materials at home before purchasing them abroad. If taken literally, this could mean that the Board ought to finance research to find means of using domestic low-grade manganese ores before it buys any more high-grade ore from abroad. Apparently the Board thinks that it might come to that because it has turned down a deal to develop an excellent foreign source of manganese, and in other commodities it is restricting current buying to domestic sources.

Because, as many Administration

officials have pointed out to Senator Thomas, 42 of the 69 materials now being stockpiled are not produced in the United States, it is impossible to build stockpiles from domestic sources. Even in those commodities produced locally in large quantities, it has been possible only recently to buy in quantity from domestic sources simply because the industrial demand was so great. In items like copper, lead, and zinc, the Board has been able to buy only about 38% of its needs from domestic sources, and it took the most skillful sort of industry cooperation to get that much into the stockpile.

Third, Senator Thomas' Report "directs" (a most unusual choice of words, because a committee of Congress has no authority to direct such actions) that any foreign contracts made by the Munitions Board in the future should be for a short term and should have cancellation clauses written into them.

Contracts Held Up

This is tantamount to saying that no contracts at all will be written, because surely no metal producer will sign a short term contract to expand his metal production when the contract can be canceled by the other party at will. Until Congress passes on this point, the Board can do nothing. The effect, in some quarters, has been disastrous.

The Munitions Board, until recently, had $835,000,000 to spend; $315,000,000 in cash and $520,000,000 in contract authority. Of this, $40,000,000 in cash and $270,000,000 in contract authority was left over from fiscal 1949. In the 1950 budget, the Board was allotted $275,000,000 cash and $250,000,000 contract authority.

Senator MacKellar's group recommended slashing this contract authority by $275,000,000, much of it to come out of the Board's estimate of the amount of tin it could buy. Unfortunately the "directives" of the Committee, as outlined here, have gone beyond economy and have interfered with the attainment of the objectives set forth in the Act creating the stockpile authority.

As an example of the contradictions thus created, one may cite Congress' own mandate in the ECA act (Public Law 47, approved April 19, 1949) which directs the ECA, with the approval of the director of the Bureau of Federal Supply, to "enter into contracts in the name of the United States for the account of the Bureau for the purchase of strategic materials in any participating country. Such contracts may provide for deliveries over definite periods, but not to exceed 20 years in any contract, and may provide for payments in advance of deliveries." This enactment is, of course, in direct conflict with the "directive" stated in Senator Thomas' Committee report.

The Senate on Aug. 26 voted to sustain the Appropriations Committee's $275,000,000 cut in next year's contract authority for the Munitions Board's stockpile program. The letters shown below, and others, had asked that this cut be restored.

Summing It Up

The picture that confronts the Munitions Board, therefore, is roughly as follows:

1. It has been, and still is, impossible to buy materials as the Board has been doing it without seriously affecting commodity prices.

2. The Board would like to avoid having its purchases serve as a subsidy for the mining industry, but it may be forced to take that action.

3. The Board's purchasing programs abroad are at a standstill because of a lack of knowledge in Congress and elsewhere as to why these programs are essential. The Board is also at fault for having approved some imprudent contracts.

4. The Board is in danger of losing its right to make long-term contracts, which are essential to smooth operation.

5. The Board has far too much of some items, far too little of others. Political considerations are responsible for this unbalance in at least some instances.

6. The industry advisory committee system, which was supposed to guide the Board in its purchases, has proven ineffective. Better results were obtained when the BFS used individual consultants.

7. The encounter with Senator Thomas shows that the Board's activities can be held up at any time.

8. The original, clear-cut objective of the stockpiling program (i.e., accumulation of strategic materials only in essential quantities for use only in an emergency) is being swallowed up in a wave of special interests and political pressures.

To clarify the present confused situation and to permit the Board to get on with its work, the following steps seem indicated:

1. Congress should re-examine and re-define the stockpile objectives. If the stockpile is to be used to assist producer groups, the domestic mining industry, for example, that fact should be written into the law and the procedures carefully worked out. It should not come about by Presidential directive or by power politics.

2. To avoid future market dislocations, as occurred last winter and last spring, the Munitions Board should take industry members, individually, into its confidence so that future purchases can be scheduled. Nearly everyone concerned knows pretty closely how much of the commodity he is interested in is in the stockpile anyway.

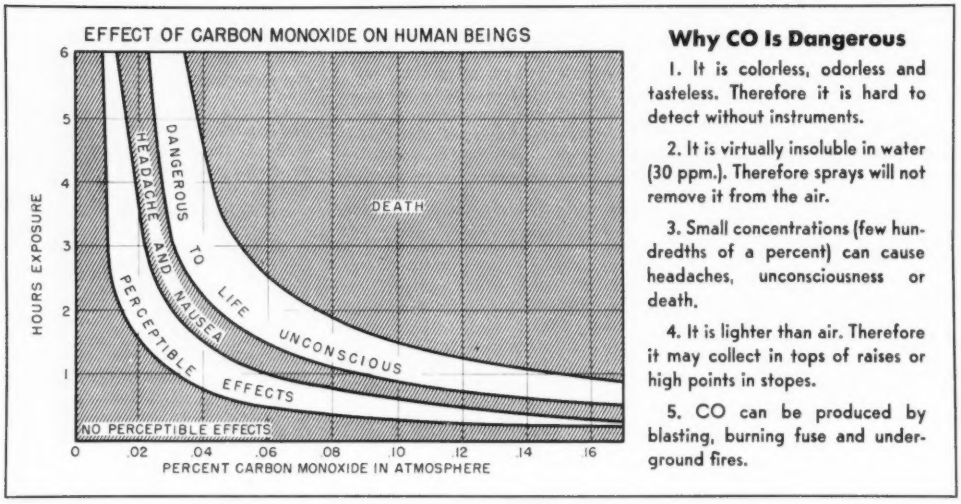
3. The Board ought to have a competent Congressional Advisory Officer whose duty it would be to explain to Congressmen why the Board has to do things as it does. This assumes, of course, that the Board's actions will be sound and in keeping with stated objectives.

4. If industry advice is sought by the Board, it should be heeded. Both the Munitions Board and the Bureau of Federal Supply should be in continuous consultation with experts in major commodities.

5. Long-term contracts should be used where indicated, but they should specify current or average market prices. Such contracts may support market prices to some extent, but their steadying influences will outweigh this factor.

6. Lastly, no attempt should be made to fix responsibility on the Munitions Board for solution to strategic problems such as developing domestic sources of high grade manganese or chromium concentrates. At present there is no Government agency charged with this responsibility, but the Munitions Board, at least, should have no part of it.

There is one final moral that might be drawn from the events recorded on these pages, and that is there is nothing either simple or permanent in Government. Sooner or later, a stockpile of raw materials in Government hands is going to be used. We can only hope that it need never be used in war and that it will never be used unwisely in peace.



Why CO Is Dangerous

1. It is colorless, odorless and tasteless. Therefore it is hard to detect without instruments.

2. It is virtually insoluble in water (30 ppm.). Therefore sprays will not remove it from the air.

3. Small concentrations (few hundredths of a percent) can cause headaches, unconsciousness or death.

4. It is lighter than air. Therefore it may collect in tops of raises or high points in stopes.

5. CO can be produced by blasting, burning fuse and underground fires.

The Carbon Monoxide Hazard

R. W. THOMPKINS

Ventilation Engineer,[1] Kirkland Lake, Ontario[2]

THE FOLLOWING REVIEW of fatalities caused by carbon monoxide gas in Ontario mines during the past 10 years is presented with the hope that this information will serve to prevent similar accidents in the mining industry. It is also the purpose of this article to increase the general knowledge of this gas so that workmen may deal with its occurrence with confidence and without fear. At the same time it is expected that the facts compiled here will discourage any complacent attitude toward CO that might exist in the minds of people engaged in underground mining operations.

Properties of CO

Carbon monoxide is a colorless, odorless, tasteless, non-irritating gas, virtually insoluble in water (30 parts per million). It is the product of incomplete combustion of any carbonaceous material and present to some degree in all smoke.

As shown in the accompanying graph, exceedingly small amounts of the gas are dangerous. A concentration of only 2 parts in 10,000 may produce these characteristic symptoms: headache, mental dullness, and physical loginess in a few hours' time.

When inhaled continuously for 6 to 8 hr., 0.01% CO is held to be enough in some instances to cause headache, dizziness, sleepiness, nausea, muscular weakness, incoordination and impaired judgment.

A concentration of 0.06% may produce headache in less than an hour and unconsciousness in 2 hr.; 0.10% may produce unconsciousness in less than an hour and prove fatal in an hour and a half. Higher concentrations may cause almost immediate unconsciousness and death within a few minutes.

Carbon monoxide gas is dissolved in the blood where it replaces the oxygen normally carried by the blood. The lack of oxygen causes unconsciousness and death when high concentrations are breathed and mental dullness and physical loginess in low concentrations.

Carbon monoxide is present in all smoke, including that from blasting. At the time of an underground fire it usually exists in high concentrations. Tests conducted after blasting in dead-ends where neither compressed air was blown nor auxiliary ventilation used, revealed concentrations of 0.50%. These tests were made 10 min. after firing a round using 70% C.I.L. Driftite powder and wooden spacers. Similar tests showed that tile spacers reduced the amount of CO produced by 50%. Burning fuse alone in a drift round under the above circumstances may be responsible for 0.01% of the concentrations obtained.

Samples of air taken at the beginning of the mucking shift in development headings void of auxiliary ventilation have indicated concentrations ranging from 0.0025 to 0.02%. In all these places compressed air had been blowing between shifts.

A nil reading was obtained only in a heading where proper auxiliary ventilation was used in conjunction with an air-water atomizer suitably directed at the face. Auxiliary ventilation alone is not enough to combat gas trapped in muck.

Samples taken in stopes having no through ventilation reveal concentrations ranging from nil to 0.02% CO, 4 to 7 hr. after blasting and blowing with compressed air between shifts. Carbon monoxide was present to some extent in 60% of the cases studied.

From Sept., 1948, to April, 1949, the following cases of gassing were reported by Kirkland Lake mines:

CASE 1. A crew driving a raise from a single-entry stope was to leave the working place 1 hr. and 45 min. after starting the shift. The raise had been

[1]Consultant for Macassa, Kirkland Lake Gold, Teck-Hughes, Sylvanite, Toburn, and Wright-Hargreaves mines.

[2]Based on information presented at the annual meeting of the Mines Accident Prevention Association of Ontario. Graph shown above is from U. S. Bureau of Standards Tech. Paper 212.

I. Concentration of CO Produced When Blasting a Drift Round[1]

Test No.	Time Sampled After Blast	% CO	Remarks
1	10 min.	0.50	Wood Spacers
2	11 min.	0.50	Wood Spacers
3	10 min.	0.50	Wood Spacers
4	10 min.	0.25	Tile Spacers
5	10 min.	0.25	Tile Spacers

[1]All tests were taken with no auxiliary ventilation or compressed air blowing. Clean round blasted in all cases.

II. Concentration of CO Remaining in Dead-End Drifts Between Shifts

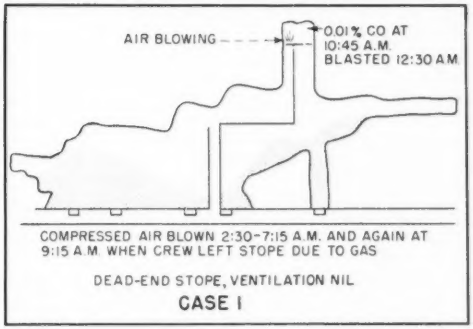
Test No.	Time Tested After Blast	% CO
1[1, 2]	1 hr. 40 min.	0.02
2[1, 2]	6 hr. 25 min.	0.005
3[1, 3]	6 hr. 40 min.	0.0025
4[1, 2]	8 hr. 20 min.	0.005
5[2, 3]	6 hr. 50 min.	0.01
6[3]	6 hr. 50 min.	Nil

Compressed air blowing in all cases. [2]No auxiliary ventilation. [2]No atomizer used. [3]Auxiliary ventilation blowing 500 cfm., 100 ft. from face.

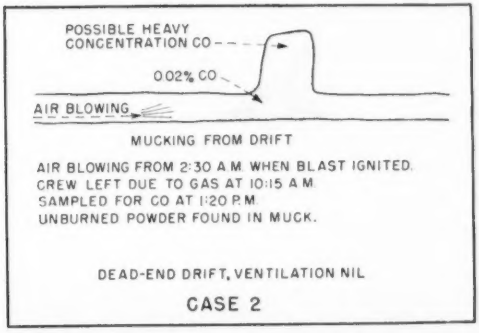
III. Concentration of CO Remaining in Stopes

Test No.	Time Sampled After Blast	% CO
1	6 hr.	0.02
2	6 hr.	0.025
3	6 hr.	Trace
4	6 hr. 30 min.	Nil
5	6 hr. 30 min.	Nil
6	6 hr. 30 min.	Nil
7	6 hr. 30 min.	Nil
8	5 hr. 45 min.	0.005
9	6 hr. 30 min.	Trace
10 (Raise)	2 hr. 14 min.	0.01

No compressed air blowing, auxiliary ventilation, or atomizers used in above cases.


AIR BLOWING
0.01% CO AT 10:45 A.M. BLASTED 12:30 A.M.
COMPRESSED AIR BLOWN 2:30–7:15 A.M. AND AGAIN AT 9:15 A.M. WHEN CREW LEFT STOPE DUE TO GAS
DEAD-END STOPE, VENTILATION NIL
CASE 1

blasted at midnight the previous night. Compressed air was turned on at 2:30 a.m. and blown for almost 5 hr. between shifts. See accompanying figure. The men reported headaches and nausea at 9:15 a.m. They did not return to the raise but were capable of light duty. The raise was tested 1 hr. and 15 min. after the sickness was reported. A concentration of 0.01% was found despite the fact that the men opened the compressed-air line when leaving the stope. A concentration of 0.04% could have caused the illness reported in less than 2 hr.


POSSIBLE HEAVY CONCENTRATION CO
0.02% CO
AIR BLOWING
MUCKING FROM DRIFT
AIR BLOWING FROM 2:30 A.M. WHEN BLAST IGNITED.
CREW LEFT DUE TO GAS AT 10:15 A.M.
SAMPLED FOR CO AT 1:20 P.M.
UNBURNED POWDER FOUND IN MUCK.
DEAD-END DRIFT, VENTILATION NIL
CASE 2

CASE 2. A raise was being mucked from the drift floor. The muck completely filled and blocked the raise. As the muck was shoveled, it rolled down the pile carrying CO with it. See illustration. The men left the working place 3 hr. after beginning the shift. Their symptoms were headache and nausea. One man returned home, the other continued on light duty. An investigation ½ hr. after they had reported illness revealed a concentration of 0.02%. Compressed air was blowing continuously. A concentration of 0.02% would be sufficient to cause the illness reported in 3 hr. Note: A gassing accident with nearly fatal consequences occurred in another district last year in which a lethal concentration of CO was pulled down from a raise as the muck was lowered. It was fortunate that two of the rescuers had first-aid training. After administering artificial respiration for 2 hr., the victim was revived.

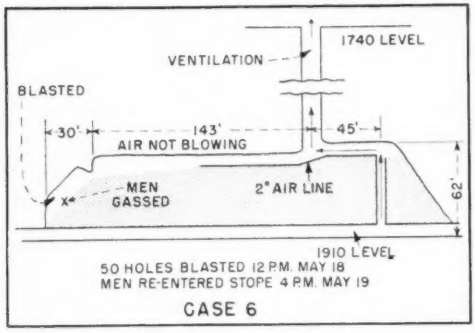
CASE 3. A crosscut 1,000 ft. from a ventilation circuit had ventilation pipe for 600 ft. The compressed air was blowing 50 ft. from the face between shifts. The mucking crew worked for about 1 hr. One man lost consciousness while tramming a car into a switch 300 ft. from the face. He was brought to the station and revived in 15 min. The men working on the mechanical loader apparently were not affected. Air in the crosscut was not tested for CO. However, a concentration of 0.10% CO could have caused unconsciousness in 1 hr.

The following review of 15 fatalities due to CO poisoning in Ontario mines between 1938 and 1948, inclusive, was obtained from reports issued by the Department of Mines. Blasting gases caused 13 deaths; gasoline engines, 2.

CASE 4. Day shift blasted over the stope manway going off shift at 3:00 p.m. The manway was lagged over and compressed air blowing in the manway only. Night shift arrived at the stope at 7:30 p.m. and cut one lagging in the manway bulkhead. One lagging was moved on one end, making a hole in the stope. After repairing a broken water line in the manway, the helper prepared to pass up the air hose to the driller and found that he was unconscious. The former went for help. The body was not recovered until 11:00 p.m. The victim evidently lost consciousness in 30 to 45 min. Therefore, the concentration would appear to have been in excess of 0.12% CO.

CASE 5. Both faces of a development drift on the

700-ft. level were blasted at 3:55 p.m. The distance was approximately 184 ft. from the shaft to each face. At 5:00 p.m. the mine manager descended alone to inspect the faces. When he did not return a search located him in the east heading at 7:12 p.m. The probable exposure was about one hour. An autopsy showed a 60% saturation of carbon monoxide in the blood. It is probable that the concentration of carbon monoxide in the drifts was 0.16% or more.



CASE 6

CASE 6. A sketch of the location of this accident is shown. The stope was worked on one shift. Fifty holes were blasted at midnight. The crew returned to the stope at 4:00 p.m. the following day. The shift-boss entered the stope at 9:45 p.m. and found both men dead on the muck pile as indicated. The evidence showed that compressed air had not been used. The driller had a mistaken idea that water would rid the working place of gas. The position of the bodies indicated that both men lost consciousness while sitting on the muck pile wetting the muck and walls.

CASE 7. A 10-hole round was blasted at 4:00 p.m. in a raise from the 225-ft. level. The raise had two compartments, with an 18-in. opening through the bulkhead, for access, to the work and for blowing air. The latter was turned on after blasting.

The night crew came on shift about 7:00 p.m. and turned off the compressed air. Each man proceeded up the raise with a piece of lagging. One man lost consciousness as the bulkhead was reached; the other lost consciousness about 50 ft. below it. The crew were missed at lunch time and a search began. The first man was brought to surface at about 11:15 p.m. and was revived. The second was brought to surface at about 11:25 p.m.; he was not revived. The exposure before losing consciousness was about one-half hour. This would fix the concentration in excess of 0.25% CO.

CASE 8. The square-up in a raise was blasted when going off night-shift on the morning of June 18. The raise had two compartments, with a bulkhead within 6 ft. of the face before blasting. The compressed air was set to blow through the bulkhead onto the face of the raise. The air blew for 5 hours until the line was broken by a back-stope crew. There was no day-shift in the raise the following day. Night shift, June 18, inspected the raise before lunch and blasted three missed holes at 11:30 p.m. They returned at 2:30 a.m. on the 19th and entered the raise. They were missed at 4:00 a.m. when the shift was finished. One man was found 25 ft. up the raise and the other about 20 ft. below the bulkhead. Both had been dead about one hour. It was estimated, therefore, that their exposure before losing consciousness was about one-half hour. This would indicate that a concentration in excess of 0.25% CO existed in the raise.

CASE 9. This accident took place in a sub-drift from an otherwise well-ventilated cut-and-fill stope. The men were instructed to shoot the square-up of a round drilled by the previous shift. To do so, it was necessary to re-blast the cut. The latter was fired at 2:30 p.m. When the men did not report to the shift-boss at the end of the shift, an investigation was started. Both were found in the stope sub-drift at 3:45 p.m. They had been injured by a premature blast, but death was due to carbon monoxide poisoning. An analysis of the blood showed that it contained 55% carbon monoxide saturation.

NOTE: The next two accidents discussed were caused by the use of gasoline motors underground. They are included in this talk to emphasize the hazard of operating equipment of this kind in a poorly ventilated place.

CASE 10. This accident resulted from operating a gasoline driven pump in the shaft. The evidence shows that the pump was operated for the last time on Friday night. On Monday two men descended the shaft for a short time without ill effects. The victim descended the shaft at 9:00 a.m., Tuesday. His body was discovered at 12:30 p.m. The discoverer of the body returned to surface without apparent ill effect. Another man went down at 5:00 p.m., became ill, and returned only to the 50-ft. level, where he was found and removed by the mine inspector.

A mine rescue crew recovered the victim's body from the shaft at 10:00 p.m.

CASE 11. This accident happened while de-watering a shaft on a single-shift basis. A gasoline-driven pump was operated on a float on the water. The procedure was to pump for about 5 hours during the shift. Next morning upon return to work the men timbered awhile, then ran the pump for the remainder of the working day.

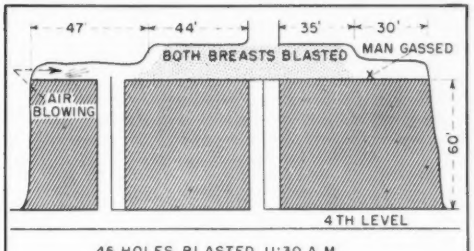
On July 15th, the pump ran from 9:00 a.m. to 12:15 p.m., then stopped of its own accord. One man descended to ascertain the trouble. He was at the pump four to five minutes and felt himself being overcome. He started to climb out, got up about 12 ft. and fell off the ladders. His head was submerged as he lay at the bottom of the shaft. The other workman then descended, raised his head from the water and barely got out of the shaft before he was overcome with the gas also. He went for help and the victim was removed about one hour after he descended. A concentration of 0.30% would produce unconsciousness in this time.

CASE 12. This accident occurred in a raise from the 1,450-ft. level. It was a timbered opening with lagging nailed to stulls acting as dividers. There were no landings in the raise, the ladders being spiked to stulls across the footwall which was inclined at a 60° angle.

The crew blasted the cut at 2:30 a.m. and the square-up at 5:40 a.m. The bulkhead was open about 1 ft. across the 5-ft. width of the manway. Two air hoses were fastened to the bulkhead, one to blow up the hole onto the face, the other to blow down the

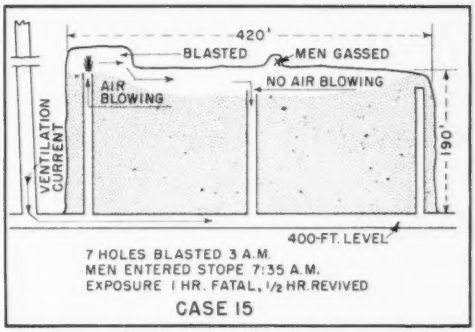
manway. The air was turned on after blasting. The raise crew went back up the raise at 6:05 a.m. After going up 60-70 ft. they decided it was too gassy and began to descend. Both men collapsed in the last 25 ft. One man was found at the foot of the raise on the muck pile at 7:10 a.m. The other rolled into a raise below the 1,450-ft. level and was recovered at 8:10 a.m.

Evidence later showed that the air hose had become kinked at the top of the raise and the air had not been blowing. Both men lost consciousness in about 20 min., which would indicate a concentration in excess of 0.25% CO.



CASE 13. A sketch of the place where this accident occurred is shown. At 11:30 a.m. 45 holes were blasted in both the east and west breasts. At 1:00 p.m. the crew returned to the stope, hoisted supplies and turned off the compressed air, which had been blowing since the blast. One man washed the backs and reported that it was gassy near the east breast. The second man while scaling passed under the east breast. A few minutes later he was discovered by his partner, unconscious, about 6 ft. past the east breast. He was dragged to a point under the east breast, where he was left because the rescuer was feeling the effects of the gas. When more help was obtained he was carried to the top of the west manway. Resuscitation was attempted but failed to revive the victim. The victim was exposed for approximately a half hour. Therefore, the concentration of carbon monoxide would be in excess of 0.25%.

CASE 14. This was an accident to a surveyor's helper in a raise. A round in the face had been fired at 3:00 a.m. The surveyor and his helper entered the raise some minutes prior to 8:00 a.m. and before the raise had been checked. They climbed 185 ft., felt unsteady, and began to descend. The surveyor arrived back in the drift in a dazed condition; his helper lost consciousness and did not get out. A miner, sent to check the raise, arrived and attempted to reach the surveyor's helper. Two more men followed in an attempted rescue. All three lost consciousness. Two of the rescuers were removed before the mine rescue squad arrived with suitable apparatus. The victim and the first rescuer were recovered by the mine rescue squad. The surveyor's helper could not be revived; the others recovered. The victim was exposed for approximately one and a half hours. The rescuer was exposed for about one hour. Using the graph, this would fix the probable concentration of CO at approximately 0.12%.



CASE 15. A sketch of the place where this accident occurred is shown. The west breast, of 7 holes, had been blasted at 3:00 a.m. Compressed air had been blowing until 7:35 a.m., when the stope crew and the raise crew arrived on shift. The raise leader went directly to the raise; the helper went to the powder box for spacers. The former was found unconscious upon the raise staging at 8:10 a.m. by the latter. The stope crew was overcome in an attempt to get the raiseman off the staging. The shift-boss succeeded in recovering all three men. Resuscitation revived the stope crew; the raise leader succumbed. The exposure of the victim was about one hour. The exposure of the rescuers was approximately one-half hour. This would fix the probable concentration of carbon monoxide at 0.16%.

What the Case Studies Show

1. Safety from this gas is not assured by providing a route for air to flow through or near the blasting face. There must be an adequate **flow of air** through the vicinity of the site blasted.
2. A jet of compressed air may be used to clear CO from the scene of the blast, but it must be suitably directed and sufficient to dilute and transfer the gas to the moving circuit of the ventilation system.
3. Dead-end high points near the blasting operations are particularly dangerous.
4. Rescuers should be warned to protect themselves from the gas lest they too become victims.

How to Prevent CO Hazard

1. Install proper ventilating equipment and follow essential ventilation practices.
2. Establish an effective general ventilation system which will facilitate the operation of auxiliary ventilation units in dead-end areas.
3. Use a suitable air and water spray discharging onto the face to lay down dust and remove soluble gases. (CO is virtually insoluble and must be removed with air, but other gases in powder smoke should be removed as well.)
4. Educate labor and supervisors on the properties of CO, its occurrence, and proper first-aid and rescue practices for victims of the gas.
5. Have on hand suitable masks for rescuers.
6. Do not rely entirely on compressed air to clear CO out of a dead-end working place.

The writer expresses his appreciation to his employers for permission to present this article, and to W. F. Morgan, safety engineer, McIntyre; G. Gedge, safety engineer, Hollinger; and C. S. Gibson, safety director, Mines Accident Prevention Association of Ontario, for assistance in the preparation of this article.

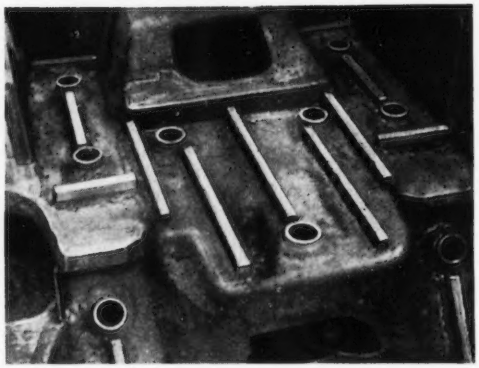
Costs and Materials Used

Tumbler

Materials:	100# stainless rod	$ 50.00	
	875# 3/8 filler rod	525.00	
	925# 1/4 electrode	111.00	
	Tubing	5.00	
	Filler Bar	69.00	
			$ 760
Labor:	Layout & Preparation 48 man-hours	$ 96.00	
	Welding 176 man-hours	264.00	
			$ 360
	Total Cost		$1120

Each Bucket (Bases Only)

Materials:	Stainless rod	10#	$ 5.00	
	Electrode	40#	4.80	
	Filler Bar	50#	29.00	
				$ 38.80
Labor:	Welding 10 hours			20.00
	Total Cost			$ 58.80



UPPER TUMBLER is leveled. Measurements to bring section to proper height and position were taken over each of 71¾-in. bolt holes. Tubes cut to proper lengths are guides to thickness of build-up. Filler bars are carefully aligned.

Welding May Cut Your Dredge

H. B. McGUIRE

Dredge Superintendent

Tuolumne Gold Dredging Co.

DREDGEMEN can save a lot of money in maintenance of the bucket line by the effective use of new welding techniques and materials. The replacement of a tumbler may mean the investment of $8,000 to $10,000 and much lost time, where welding will restore the tumbler to operation at an estimated cost of about $1,100. Similar savings can be effected in bucket repair.

The magnitude of the maintenance problem can be better appreciated after a look at the bucket line mechanism. The bucket line and hexagonal upper tumbler are actually no more than a specialized chain and sprocket. A 12-cu. ft. dredge, digging 75 ft. below water, uses about 100 buckets, weighing with their connecting pins approximately 2½ tons each. To this add the weight of the material torn from its place of deposit and carried upward. The force to lift this load is developed from a 350 to 400-hp. motor, geared down from 700 to 800 rpm. to about 4 rpm.

Force transmitted from tumbler plate to bucket base elongates the eyes of the buckets and materially lengthens their pitch. Constant wear at the bases of the buckets works toward the same end. Conversely, the constant impact and

TREMENDOUS FORCES at work on the bucket line cause elongation of the eyes of the bucket and the lip to wear down from 1 to 1½ in. in 10 days.

ever-increasing slide of the buckets because of their eye elongation and worn bases tends to decrease the pitch of the tumbler, thus aggravating existing differences.

Installing thicker wear plates on the tumbler will temporarily take care of this discrepancy. Finally, however, the point is reached where the thickness of the plate required makes new plates impracticable. Operating under such conditions will cause failures requiring the purchase of a new bucket line.

Building up the tumbler by a weld deposit some 2 in. thick, requiring from 1,600 to 1,700 lb. of filler material, offers an economical solution. It is possible to do such a job in 4½ days (two men per shift, three shifts per day) as compared with 10 or 12 days to change the upper tumbler.

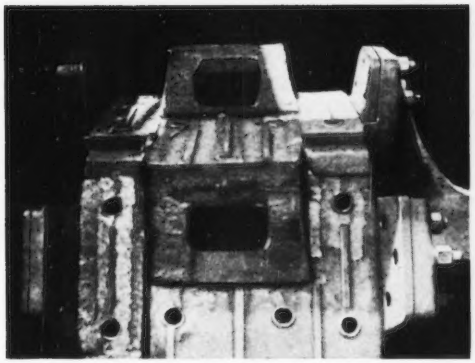
Filler material must be hard, tough and able to fuse properly with the parent metal of the tumbler. It must be sufficiently low in cohesive strength to permit fast deposition in layers in excess of 2 in. thick.

Here is how the job was done on one dredge operating in California.

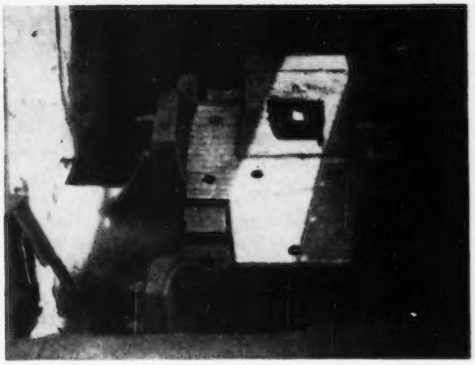
1. Actual desired pitch of the tumbler was determined from a full-size layout of the buckets. A jig was constructed which, when placed on a machined surface of the tumbler shaft, indicated the desired height of the tumbler plate. Properly leveled, it insured correct indexing of the section in its proper tangential position.

2. With the first section leveled and the jig in position, measurements were taken for the amount of build-up required. A gage was installed that made use of the 150 cut teeth on the 16-ft. diameter bull gear on the tumbler shaft. By turning the gear 25 teeth to the gage within 1/32 in., the 4-ft. dia. tumbler would be indexed more closely than it could be built up.

3. Bucket line was removed from the upper tumbler. The tumbler was leveled to the gage and



BUILD-UP MATERIAL is deposited by two men per shift working simultaneously on one section at a time. "Two-Tone" process uses ¼-in. electrodes and ⅜-in. cast-manganese filler rods. Job requires 1,700 lb. of electrodes, takes 176 man-hours.



WEAR PLATE is restored after eight heavy passes and one light finishing pass. No grinding was necessary and judicious alternation of sections eliminated the need for pre-heating. Here wear plates are installed on one section.

Maintenance Costs

the gear indexed. Measurements to bring each section to proper height and tangential position were taken over each of the 71 ¾-in. bolt holes drilled to hold the wear plate. Tubes were cut and machined to proper lengths (from 1½ to 2⅞ in.). These were welded to the tumbler to serve as guides to the thickness of build-up in each section. Filler bars were also cut to proper height and aligned by a straightedge held on the tubes. Strips of thin material were welded around all the edges to the shape of the overlying wear plate. This work took 48 man-hours.

4. Build-up material was deposited by two men per shift, working simultaneously on one section at a time. Judicious alternation of sections eliminated the need for reheating. Eight heavy passes and one light transverse pass were needed, consuming a total of nearly 1,700 lb. of electrodes. No grinding was necessary. This job took 176 man-hours or only 3¾ days elapsed time.

A "Two-Tone" process was employed, using ½-in. high tensile electrodes and ⅜-in. special cast-manganese filler rods.

Using the same materials, savings can also be made in bucket maintenance.

In this case specifications called for the buckets to be set up level in the shop with bases upward. Manganese filler bars were set over the back eyes to bring the bases back to their normal plane. All cracks were removed by grinding or flame-cutting prior to rewelding with stainless steel electrodes. Eyes were to be brought back to round and bushings reseated tightly.

Having extra buckets in hand, it is possible to rework the worn buckets without interruption to the line. One man can rebuild a bucket base back to the original point in 8 to 10 hours. Front and back eyes are built up to round in another day. There is usually in excess of 1-in. wear at the back eye. It has been the custom to weld a 4 or 5-in. strip of mild steel on each outside edge of the back eyes for safety. This is done in 16 man-hours.

No extraordinary precautions such as water baths need be taken in welding these manganese steel castings. All welding is done at ambient temperatures, materially reducing time and cost.

Materials and Cost

Tubing used in rebuilding the tumbler, a low-alloy steel casting, was seamless steel tubing of 2¼-in. OD. and ¼-in. wall thickness. Filler bars were rolled nickel-manganese steel bars of ¾ x 4-in. stock, cut to size. Edge strips were 18-8 stainless, ⅛ x 2 in., lengths as needed.

To weld the filler bars, strips and tubes, 3/16-in. electrodes of 18-8 or 19-9 Cb stainless were used. The "Two-Tone" build-up was accomplished with ¼-in. AWS E-7010 electrodes and special ⅜-in. cast manganese filler rods containing 30% manganese, 10% nickel, 2% vanadium and 1.75% carbon.

Costs and amounts of material are given in the accompanying table. These costs compare very favorably with new replacements. Figuring cost of installation of a new tumbler without the saving in loss of production, it is doubtful that such a job be done for less than $11,000. Total cost of the welded build-up was $1,120 or 10%.

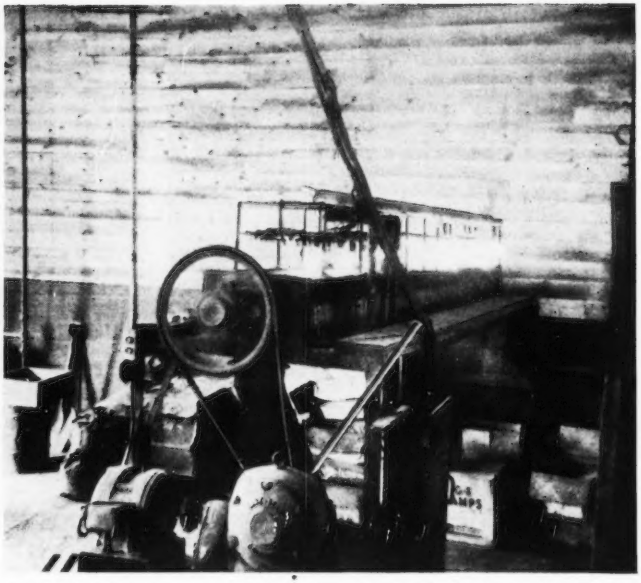
The deposit of filler material on the tumbler has excellent resistance to flat and edge impact, but it is not forgeable and cannot be annealed or machined.

After two weeks of operation the deposit had shown no signs of edges cracking or chipping out. Wear plates placed directly on the welded surfaces showed no signs of movement until after six days of operation. Normally plates had to be tightened within two hours of changing.

Rebuilt buckets placed in the line with new buckets show less wear than new ones at the point of contact with the lower tumbler. This is because of greater hardness and resistance to impact of the welded bases. In six months of operation, no failures or cracks have been discovered in the rebuilt buckets.

Infra-Red Heater Lowers

J. T. HANVEY, JR.
Mill Superintendent
Tungsten Mining Corporation
Henderson, N. C.



CLOSE CONTROL of concentrate drying, without sintering of sulphides, is achieved in this drying rack heated by infra-red bulbs. Screw conveyors move material under lamps.

INFRA-RED RAY heat lamps have been found both effective and comparatively inexpensive in drying gravity and flotation concentrates in the mill of Tungsten Mining Corporation in Vance County, North Carolina. Although the heat-producing and penetrating properties of infra-red rays have been used in industry for many years, I believe that this mill was the first to apply these heat lamps to the drying of ore concentrates.

Treating three or four tons of high-grade tungsten concentrate per day, the heat lamps reduce its moisture content to less than 0.02% at a cost of $1.85 per ton. Before the heat lamps were tried, it cost about $3.00 per ton to do the job on an open hearth, heated by a wood fire.

We estimate that a 4 x 24-ft., mechanically-rabbled, hearth dryer, heated by oil, would cost about $5,500 to build and would be about as expensive to operate as the heat-lamp arrangement. Capital cost on the latter, however, was only $1,800.

If we were treating larger tonnages, a rotary dryer would be required, but because our concentrates are worth about $0.75 per lb., we cannot afford the risk of dust loss that would go with a rotary dryer.

Cost of power consumed by the heat lamp dryer is $0.35 per hour. Cost of power to drive the dryer screws is $0.035 per hour. Lamp replacement costs about $30.00 per month. Attendance requires no extra labor.

Search for a better drying method was started some time ago by Mr. H. S. West, president of Tungsten Mining Corp., who realized that conventional methods were not suitable for our purposes, where close temperature control is required and large-tonnage methods are too costly.

The aim at our plant must be to dry the material completely, yet not roast any of the contained sulphides. The tungsten concentrates go to a magnetic separation plant after drying, and if any of the sulphides are roasted, the magnetic separation is hindered.

Mr. West tried heat lamps with good results except that it was difficult to find a means of moving the concentrate along under the lamps. Several methods, including belts and vibrating conveyors, were tried but none was completely satisfactory. It was clear that to get complete drying, it would be necessary to mix and turn the concentrates continually. It was suggested that a screw conveyor be used to transport the concentrates under the infra-red lamps.

Two simplex screw conveyor type driers, with infra-red heat lamps of 250 watts, were constructed. These driers as originally installed were far from satisfactory, but they did furnish data and operating information so that satisfactory driers could be designed.

The first trouble encountered was the tendency of the screw to overload itself with wet concentrates. It was readily observed that the capacity of the screw decreased as the concentrates dried. Many heat lamps were broken and much wet concentrate was discharged that had to be redried before this overloading defect was corrected.

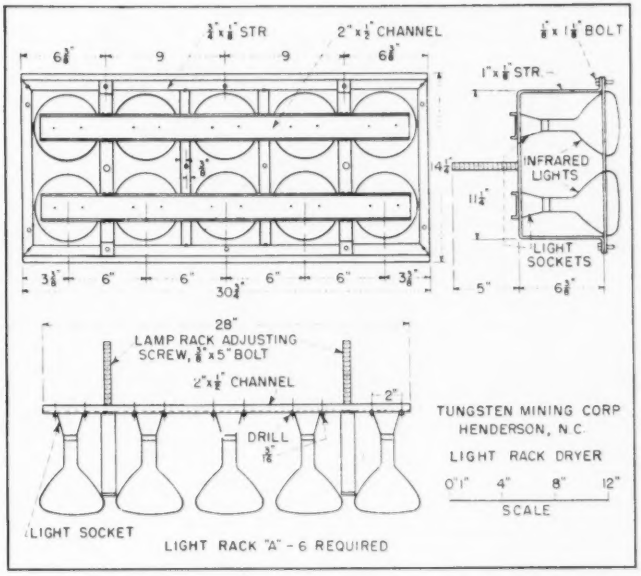
The solution was to taper the screw for 3 ft. at the feed end of the driers. The screw conveyors were tapered down to 1½ in. less diameter at the feed end than the original diameter of the screw. Since this was done, little or no trouble has been encountered in overloading of the driers.

Special Lamp Developed

Due to increasing plant capacity, a higher wattage lamp was desired. The 250-w. hard glass lamp was replaced by a 375-w. soft glass lamp. The hard glass was desirable but was not then available in a 375-w. size. Due to uneven expansion and contraction of the soft glass bulb upon heating and cooling, there was almost a prohibitive breakage of these 375-w. lamps.

It was found more economical to leave the soft glass lamps burning up to 36 hours than to cut them off when not in use. The cost of the power consumed was less than the normal lamp replacement, due to breakage, when the driers were cut off and the lamps allowed to cool. Even with this precaution the breakage of the soft glass lamps accounted for more of the cost of dry-

Concentrate Drying Costs



EASILY-BUILT rack holds 375-w. lamps. Wiring is typical parallel lighting circuit with fuse for each five lamps. Asbestos insulated wire connects sockets to feed cable.

ing than did the power consumed.

This problem was taken up with the Lamp Department of the General Electric Co. They made up a trial batch of hard glass 375-w. lamps and sent them to the Tungsten Mining Corp. for use in their concentrate driers. These lamps proved satisfactory and cut breakage cost to a minor item. Several other manufacturers of lamps were tried before the General Electric clear glass bulb, reflector type, R-40, heat resistant glass, 375-w., 120 v., infra-red heat lamp was developed. This lamp is now standard.

Improved Model Built

New driers were designed and built in the company's shop to fit in with the increased mill capacity from 200 tons to 300 tons per day. These new driers have been in service for over one year and have met all expectation as to service, low maintenance, and operating cost.

The larger of the two driers is a duplex screw conveyor type with an over-all length of 24 ft. 6 in., including the feed hopper and drive. The screws are 6 in. in diameter and turn at 1.25 rpm. They are 20.5 ft. long. The effective drying length of this drier is 19-25 ft. There are porcelain receptacles for sixty-six 375-w. infra-red heat lamps. These lamps are spaced on 7-in. centers and are mounted on adjustable racks so as to control the distance of the lamps above the screws. The normal distance of the bottom of the lamps above the screw is ½ in.

This drier handles minus 0.07 in. Ton-Cap screen sizes, unclassified, table concentrates after most of the sulphides have been floated off and the non-float deslimed and filtered. The moisture of the average feed is 6% and the discharge product has from zero to 0.05% moisture. The capacity of this drier is 7,000 lb. per 24 hours. For this capacity and results only forty-six 375-w. lamps are used.

The other drier, which handles minus ⅛ in. Ton-Cap screen size jig concentrates, unclassified and after draining in sieve buckets until about 5% moisture remains, is a simplex screw conveyor type made in two sections. The sections are mounted on a steel frame, one above the other, and are driven by the same motor-reducer drive.

The screws move at 180 deg. to each other and are the same diameter as the screws in the larger drier. Both are made from the same helicoid, stock size, flights. This drier was designed to conserve floor space and has an over-all length of only 11 ft., with the same effective drying length of 19.25 ft., as the larger drier described above. The top screw, which receives the wet feed, turns at 1 rpm. The bottom screw, which receives the discharge from the top screws, turns at 2 rpm.

Due to the decreasing capacity of the screw as the concentrate drys, the higher speed on the lower screw was necessary in order to bring both screws in balance. This drier has a capacity of 6,000 lb. per 24 hours and uses thirty-four 375-w. infra-red heat lamps. The moisture content of the discharge is from zero to 0.02%.

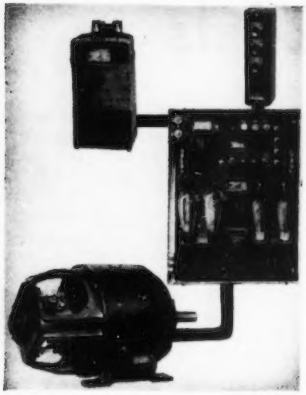
My experience in drying concentrates similar to those we are treating includes use of hand-rabbled hearth-type driers, both wood-fired and electrically heated, wood-fired Lowden driers, and wood-fired rotary driers. I doubt if any of them would give a lower per-ton cost than our present method at current rates for labor and supplies. I am positive that none of them would give as desirable a final product for magnetic separation as do the infra-red lamps.

In comparing costs, it must be remembered that we are drying a small tonnage to complete dryness with minimum dust loss. At the same time, we are making a most desirable product for magnetic separation, from which the final product must meet rigid specifications as to minimum grade and maximum impurities. Our final product has a value of about $1,900 a ton if specifications are met.

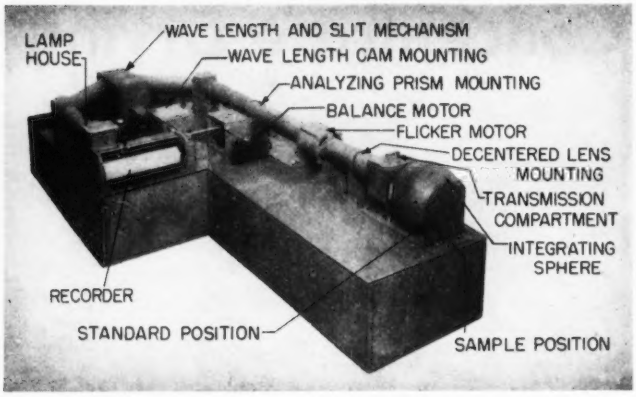
The infra-red driers are ideal for intermittent service. Within five minutes after the lamps are turned on, the heat is at maximum temperature. There are no precautions in shutting down beyond cutting off both conveyor and lamp switches. I know of no other drier that is so easily cut into and out of operation as this one.

I take this opportunity to thank Mr. H. S. West, president, and Mr. J. R. Sweet, general manager, of Tungsten Mining Corporation, for permission to publish this article.

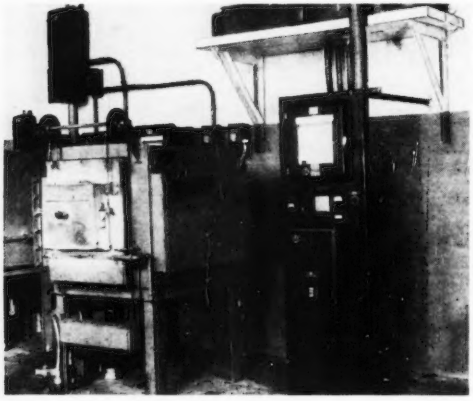
Electronic Applications in Mining



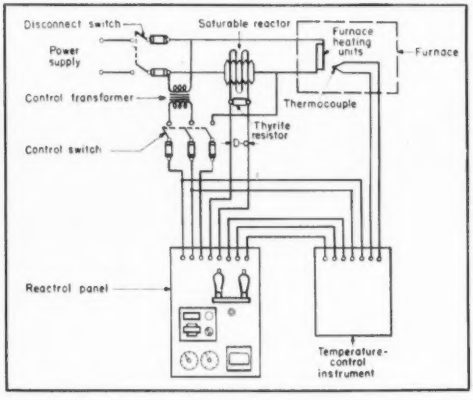
THY-MO-TROL DRIVE operates a variable-speed d.c. motor from a.c. power circuit.



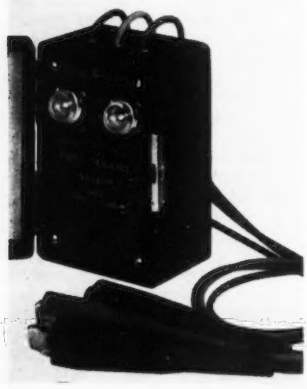
PHOTOELECTRIC SPECTROPHOTOMETER is useful for performing quantitative analyses of molybdenum, vanadium, copper, zinc, zirconium, hafnium and titanium.



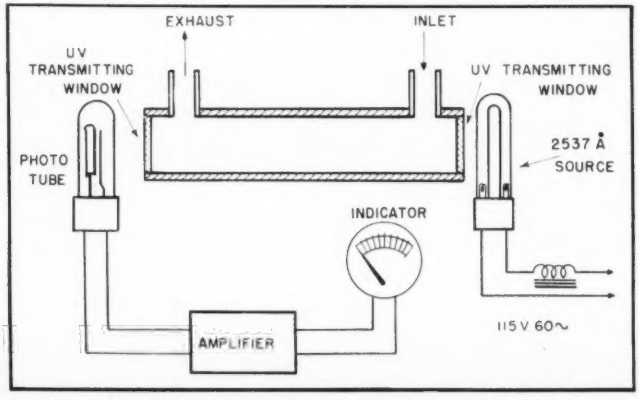
TEMPERATURES OF ELECTRICALLY HEATED assay and laboratory furnaces are accurately controlled with this electronic device.



CIRCUIT DIAGRAM of the electronic equipment used to control temperatures of various types of electrically-heated furnaces.



PHASE-SEQUENCE INDICATOR prevents damage to electric mining machinery.



MERCURY-VAPOR DETECTOR measures concentrations of mercury vapor as low as 0.004 to 0.37 parts per million by volume with an accuracy of 5% plus or minus.

How Mining Men Are Using Electronics Today—III

J. A. SETTER
Denver Office
General Electric Company

ELECTRONIC MOTOR CONTROL. An ingenious industrial electronic system has been perfected for operating a variable speed d.c. motor from an a.c. power circuit. It is known as a Thy-mo-trol drive. Thyratron tubes supply d.c. for the motor whose starting, acceleration, and speed are all controlled electronically. This system has an almost unlimited application.

Components of a typical Thy-mo-trol drive are shown on page 84. It consists, first, of an air-cooled transformer for supplying the proper voltages to the various tubes from the a.c. power line. Second, an electronic panel containing two sets of rectifier tubes to supply d.c. voltage to the armature and field of the motor, separately. Small electronic tubes control the firing of the rectifier tubes at the proper time by receiving voltage and current signals from the motor as the speed and load conditions vary. These tubes provide the brains which respond instantly to the most minute signals. Third, a simple control station having various push buttons for starting, stopping, reversing, etc., plus a small speed-adjusting rheostat for varying the speed of the motor over a range of 100 to 1, if desired. Fourth, a d.c. shunt-wound motor with special characteristics for wide range speed control, which drives the ultimate load.

The Thy-mo-trol system provides rapid smooth acceleration at a constant current (without requiring conventional starting resistors) and eliminates torque peaks. When the motor reaches any speed set by the rheostat, it operates at constant speed for no-load to full-load and provides full torque even at very low speeds.

The hand rheostat can be replaced by other automatic controlling means such as a potentiometer on a recording instrument, a variable inductance, tachometer generator, or other variable such as a microphone to change the speed of the d.c. motor. It is here that its greatest application seems possible in the mining industry, to give automatic control of a process.

Thy-mo-trol Drive on Sintering Conveyor. The benefication of low-grade ores is becoming increasingly important. Most low-grade ore such as taconite must be ground very fine for proper separation, and the resulting concentrate is a fine powder which must be sintered or made into hard pellets to be suitable for the furnaces. In the sintering process, the powdered concentrate is mixed with 4 to 6% pulverized fuel and the mixture distributed on a long, slow-moving chain grate. The mixture is ignited and combustion is maintained by a large induced draft fan connected to suction boxes under the grate. After leaving the grate, a water quench produces a clinker.

A Thy-mo-trol drive is ideal for driving the chain grate and has been installed in a large western smelter. With the strong suction pressure maintained by the fan, it is necessary to maintain a uniform thickness of sinter on the grate or blow-holes will result, for example, if the bed is too thin. A special potentiometer measures the pressure differential between the top and bottom of the sinter bed. The output is fed into the speed controlling circuit of the Thy-mo-trol drive. If the bed starts to get too thin, the pressure differential drops and speeds up the conveyor to bring in more sinter from the feeder hopper. Conversely, the conveyor slows down when the bed gets too thick to allow proper combustion.

Control of Feeder to a Ball Mill. One of the serious problems of milling is the control of feed to a ball mill to get maximum efficient loading of the mill. If manual control is desired, a small remote speed control rheostat can be mounted and the operator can vary the speed smoothly over a wide range. For automatic control, a microphone or "electric ear" has been developed which checks the load in the mill by the sound it makes. By suitable connections, the change in sound could be made to change the speed of an electronic drive on the feeder and keep the load in the mill at a desired level.

It is also possible to use some form of a contact-making ammeter or wattmeter having contacts on each side of a predetermined value of current or power in the motor driving the ball mill or crusher. If the load is too heavy, for example, the upper contact could be used to control the Thy-mo-trol drive to slow down the feeder. To prevent fluctuating loads from changing the feeder speed unnecessarily, electronic time relays might be necessary as described previously. A large copper mine in Utah has a successful installation of this type of control equipment.

Another large mill keeps the tonnage of feed to the ball mill constant. As the circulating load on the mill changes, a thermal converter on the classifier drive operates the feeder for a new feed by raising or lowering its speed. The screen analysis of the classifier overflow is held constant by means of an overflow density control system.

There are undoubtedly many other types of feeders and conveyors in the various operations which can be driven with Thy-mo-trol drives and controlled from sensitive elements such as contacts on automatic weighing scales, temperature variation, pH, viscosity, vacuum, pressure, flow, etc., and possible application studies would be welcome by the electronic manufacturer.

Electronic Process Control Applications. One of the new fields in which electronics plays an important role is in automatic process instrumentation and control. Due to its complexity, it can only be discussed briefly here. Process instrumentation is the measurement and control of such variables as temperature, pressure, flow, liquid level, humidity, gas analysis, pH, thermal conductivity, etc. It includes primary elements, measuring circuits, controllers, and many controlled elements to perform some tasks.

Many electronic devices are used with other forms of control such as electrical, pneumatic, hydraulic and

mechanical, to regulate the finished product.

There are many primary elements for electronically measuring some of the above process variables either by inferential or direct methods. One of these is the photoelectric potentiometer recorder which uses a small reflecting mirror on a sensitive galvanometer element connected to a thermocouple. The signal deflects the galvanometer, causing a light beam to strike either of two photoelectric relays and control the grid of an electronic amplifier. The output may have for its load a recorder, relay, solenoid valve, motor, etc., depending on the process.

A continuous type electronic potentiometer known as a pyrotron has been developed for use with a platinum resistance temperature detector and responds to temperature changes of 0.025 deg. F. A modification of this can also measure and control pH, vacuum, and even the b.t.u. in a heat exchanger.

In the copper milling field, many operators regulate their reagents by the analysis of their products, and use a continuous colorimetric recorder to compare the depth of blue color.

Another type of analyzer for zircon and sphalerite depends on the fluorescent character of the material. An ultra-violet light shines on the material on a moving belt and a photoelectric cell measures the purity of the product by the intensity of fluorescence.

An automatic process control can give a continuously trouble-free metallurgical operation by controlling rate of feed of the ore, water, and reagents at various points in the process with a given uniform quality feed.

Process control equipment is now being considered by a large potash company in France and also one in New Mexico for a potash flotation system for recovery of potassium chloride from sylvinite ore. It is particularly adapted for the Dorr tray thickener for concentration of the finer mesh concentrates from the flotation cells. The whole system consists of a number of motors driving the thickener, various types of pumps and starters, together with electronic controls for measuring solution clarity, total solids flow, and specific gravity. The final filter cake is delivered to rotary kilns where it is dried to give the finished product.

Electronic Control of A.C. Power. A simple electronic tube also has the ability to control large blocks of alternating-current power without the use of energy consuming resistors.

One of these is the electronic induction heater, in which a high-frequency current is induced in a metal to be heated by means of a small coil surrounding the metal part. As the metal resists the rapid flow of electrons, its outer surface becomes red hot within a few seconds, whereas the center is still cool. It is thus possible to heat-treat the outer teeth of gears, crankshafts, and outer parts of mining machinery without disturbing the inner structure of the metal.

An interesting mining application is in South Africa where it is being successfully used to silver braze the carboloy inserts on rock drills.

Electronic Control of Electric Furnaces. The accurate control of temperature on electrically heated heat treating, assay, laboratory, and other types of furnaces has always been a problem. Conventional on-off temperature control instruments may give wide temperature fluctuation in furnaces of small thermal capacity and overshoot on batch furnaces.

An electronic Reactrol system automatically regulates the continuous power input by varying the impressed voltage on the electric heating elements in accordance with temperature requirements. It prevents overshooting of temperature and applies full power to the heating elements while the load is being heated, but gradually decreases the input as the charge equalizes. When correct temperature is reached, the input is reduced so only the heat losses are supplied, which gives uniform temperature and long life for the heating elements. A typical installation of a box furnace is illustrated.

The a.c. power to the furnace passes through a saturable reactor, which is a simple inductance on an iron core. This reactor, however, has a special d.c. winding which is supplied from an electronic rectifier panel. The reactor acts as a valve to regulate the amount of power to the heating elements, depending on the value d.c. impressed which more or less "saturated" the iron. The temperature control instrument and thermocouple determine this amount, together with the tubes. When the amount of d.c. is zero, the power input to the furnace is a minimum, whereas a high d.c. current gives maximum power. It can be seen that variable amounts of d.c. throttles the valve to give a very accurate control system with no moving parts.

Mercury and Sodium Lamps. Other electronic light sources not to be overlooked are the high intensity mercury and sodium lamps used for floodlighting and street-lighting our mining communities and operations. Mercury lights are particularly valuable in lighting large areas efficiently and economically. They may also be useful on picking tables for sorting certain types of ore from rock.

Electronic Equipment for Maintenance Men and Mining Repair Shops. One of the simple, inexpensive devices for maintenance men is a phase sequence indicator. It has no moving parts and is useful for predicting the rotation of polyphase motors on mining machinery, and can prevent damaging a machine by assuring proper direction of rotation. It also determines proper connections for paralleling generators and transformers and many other uses. Electronic glow lamps indicate the phase rotation of the applied voltage.

To determine insulation faults and weaknesses in motors, generators and other electrical equipment before destructive failures occur, an electronic insulation resistance meter shown is available. It has four scale ranges to check resistances from 0 to 20,000 megohms with an output current flow of only 2 milliamperes and is safe to operate.

When other electronic equipment is to be tested or where conventional voltmeters load the measured circuit too much, a vacuum tube voltmeter is available. It measures voltage from 0.001 to 300 even at high frequencies and is a valuable tool.

Vibration of rotating mining machinery has always been a serious problem. An industrial electronic balancer made in Denver detects vibration kinetically and dynamically and permits pulleys, gears, motors, fans, etc., to be balanced quickly. A similar portable model can be used to balance the largest draft fans, flywheels and large motors on their own bearings. In one unit, a motor rotor is mounted on ball-bearing supports and brought up to speed with a motor-driven belt. Vibration indicators cause a neon stroboscope lamp to flash momentarily and show position of unbalance. An electronic amplifier and

meter shows the magnitude of unbalance.

Electronic Laboratory Testing Equipment. Electronic laboratory testing equipment is usually very elaborate and costly but the results produced justify their expense and pay for themselves many times over.

One of the more involved devices is a photoelectric recording spectrophotometer which is the ASA standard of color and accurately records 2,000,000 different colors. It is very useful in the chemical laboratory and gives qualitative and quantitative colorimetric determination of molybdenum, vanadium, copper, zinc, zirconium, hafnium and titanium. It is also useful for mixing pigments supplied by the mining industry to the paint industry. This instrument plots a curve of the light reflected or transmitted by a sample against wavelengths of light and is very accurate.

An electronic leak detector is used by one of the Bureau of Mines laboratories in Colorado for special investigations for locating small leaks in vacuum systems. It will detect a leak so small that only one cubic centimeter of helium (used as the tracer gas) at atmospheric pressure will pass through the opening in 16 years. It can detect a leak within one second in a small system.

Where rapid determinations of the concentration of one element or compound in the presence of others is desired, an X-ray absorption photometer is available. We can measure ash content of coal from the same vein, determine the quantity of lead in gasoline, sulphur in oil, amount of silver in silver nitrate solutions and amount of metals in other process solutions. This equipment promises to have many important applications.

An electron diffraction instrument shown is a very valuable research tool in many fields of endeavor. In the manufacture of graphite, crystal structure and orientation are revealed by studying diffraction photographs. In powder metallurgy determination can be made of alloying properties.

In making pigments, the crystalline structure which affects covering power can be controlled. The nature and structure of boiler scale and chemical residues can be detected early and means employed to control them. Other applications may be apparent.

If a process requires the concentration of one component in a mixture of gases whose characteristics can be determined by the thermal-conductivity method, an electronic thermal gas analyzer is available. It continuously records the gas and sounds an alarm whenever the concentration exceeds prescribed limits, and can control valves or motors to make a correction.

In one of the large mica mines in South Dakota an interesting instrument is used to test block mica for power factor. It shows in some instances that heavily stained mica has a lower power factor than clear mica, although by conventional India standards such mica commands a lower price than it should for use in insulating electrical equipment. It has made possible the grading of mica to command the best price for the various qualities.

Electronic Process Control Instruments. In a previous section on process control, a number of electronic instruments were briefly described and a host of others are available from a number of manufacturers. One other device finds an important place in a mining process and should be described. It is an electronic mercury vapor detector for use in the metal mining and smelting industry, and indicates concentrations of mercury vapor in the air which may be injurious to the health of workers. A schematic sketch of the detector is shown. It consists of a portable metal case containing a chamber through which atmospheric air is circulated by means of a blower. A small ultraviolet lamp emitting 2537 A. U. radiations through the gas chamber to a photo cell. Whenever mercury vapor passes through, it scatters the ultraviolet light and the decrease is measured on a small calibrated indicating instrument. The detector measures directly a mercury vapor concentration from 0.004 to 0.37 parts per million by volume with an accuracy within 5% and thus precautions can be taken to keep concentrations below harmful values. A large smelter has found this detector useful in detecting harmful concentrations of hydrogen sulfide gas in the air. The same ultraviolet dispersion appears with this gas in the chamber to give readings on the instrument.

Electronic Communication Equipment. Rapid communication is as necessary for efficient mining operations as in any other industry and considerable money can be made by increasing production and saving of time.

Radio Telephones for Mine Locomotives. During the past few years a similar type carrier current telephone system has been developed for use on mine locomotives. Such equipment must be very rugged to withstand the severe mechanical abuse imposed by haulage operations and be easily removable for servicing. Frequency-Modulation type (FM) equipment is usually used for this operation because the ratio of signal to noise is better and static and arcing of trolley shoes and rails does not materially affect transmission.

On each locomotive is installed a transmitter and receiver operated from the d.c. trolley power. The dispatcher's station and any other permanent stations can operate from the power supply available. The high frequency signals are transmitted over the trolley wire system similar to the mine hoist described.

It is safe to predict that most mines will install these FM radio telephones because of the advantages obtained. Haulage operations can be speeded up and output increased with fewer locomotives and cars because mine cars can be dispatched quickly to any part of the mine required. The face preparation cycle can be shortened by obtaining timber and other supplies when needed, and maintenance men can be summoned in case of trouble. Greater safety is possible in haulage operations by warnings between two locomotives on the same track.

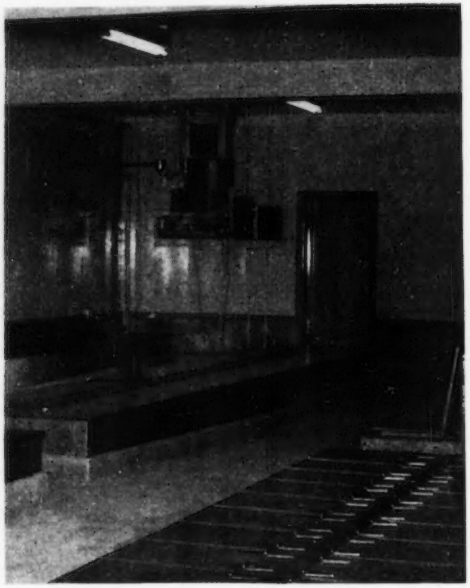
Other Types of Equipment. Additional electronic equipment useful to the mining industry includes fluorescent lighting on surface and underground; germicidal lamps for mine drys and first aid rooms; Geiger counters and ultraviolet ray units for prospecting for radioactive and fluorescent minerals; geophysical prospecting instruments; and inter-office communication units.

With all of the interesting applications which have already been made of various electronic equipment in the mining industry, the reader should be thoroughly convinced by now that electronics should find many uses in all phases of his operations. Electronic equipment is rugged, long lived, easy to service, and provides a solution to many problems which are difficult if not impossible to solve by other methods.

The Problem

OLD CHANGE ROOM contained street-clothes lockers and overhead hangers preventing free circulation of aluminum dust during application of aluminum therapy at Bralorne Mines, Ltd. Drying dust on mine clothes was objectionable, and aluminum dust drifted into lockers and settled on miners' street clothes.

How It Was Solved



ABOVE. Street-clothes lockers were eliminated in this new digging-clothes section. Overhead hangers were replaced by floor lockers with hinged covers through which digging clothes can be lowered and suspended in the room below. Now aluminum dust can be circulated freely during therapy periods.

Modern Mine Dry

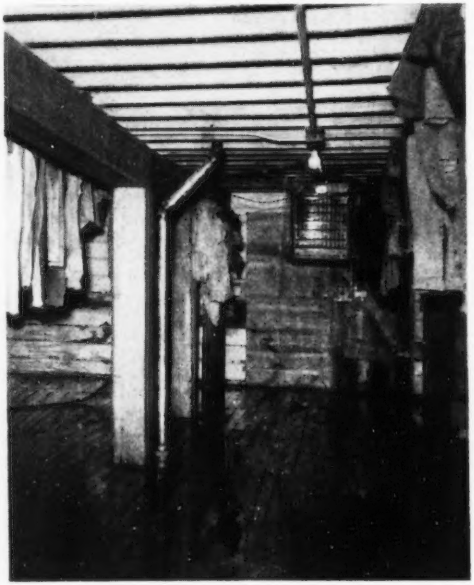
SWANSTON GIBSON
Chief Engineer, Bralorne Mines, Ltd.

THE MINE DRY AT BRALORNE MINES, LTD., Bralorne, B. C., was redesigned and enlarged to eliminate the following objectionable features of the old dry:

1. Clothes hanging overhead and steel lockers on the floor cluttered up the room and prevented free circulation of aluminum dust particles. (Bralorne Mines uses aluminum therapy.)
2. Aluminum dust settled on workers' street clothes in the lockers.
3. Particles of silica drying on the miners' digging clothes dropped off while aluminum dust was being circulated.

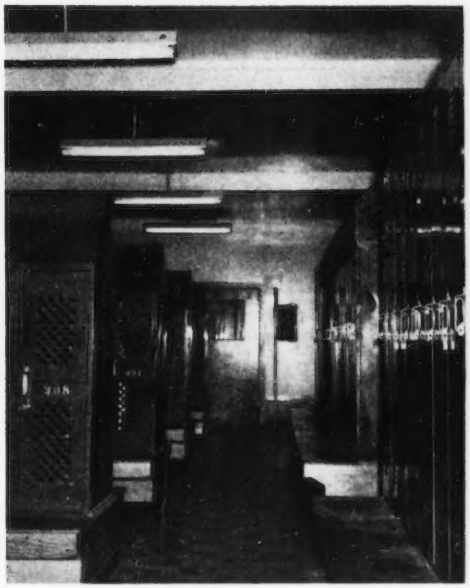
Consequently several unique modifications were made to correct these features. Steel lockers were eliminated from the digging clothes section. Floor lockers fitted with hinged covers were substituted for overhead hangers, and digging clothes were suspended from hooks in floor joists beneath the new-type lockers. Now aluminum dust can be circulated freely in the digging clothes section. Double sets of doors on each end of the room provide air locks through which the crew may pass freely without disturbing dust-laden air in the room. An exhaust fan clears the room after the workers have gone on shift.

At the close of the shift the crew passes through the shower room, then the solarium, and finally to the new street-clothes section. These and other features are explained in the captions of the accompanying photographs on this and the opposite page.

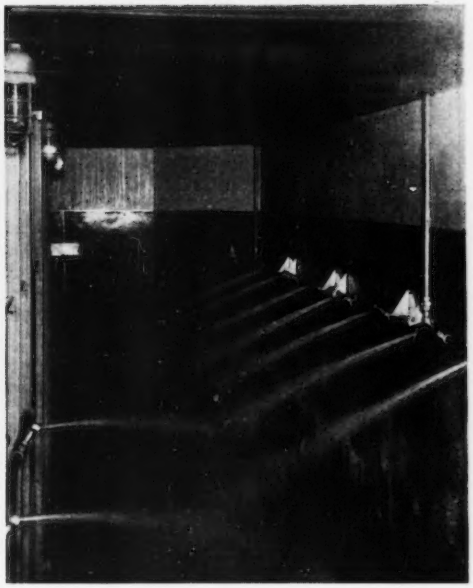


BELOW. Digging clothes are suspended from floor joists of the room above. A unit heater dries out the clothing. This arrangement prevents dry silica-bearing mine dust from contaminating the air while aluminum dust is being circulated in the upper room of the digging clothes section of the change house.

Other Conveniences



STREET CLOTHES are kept in steel lockers in a separate room which men enter at the close of shift after having removed mine clothing, showered, and passed through the solarium. Unit heaters and fluorescent units keep the room bright and comfortable. Lockers are arranged in bays flanking the main passageway.

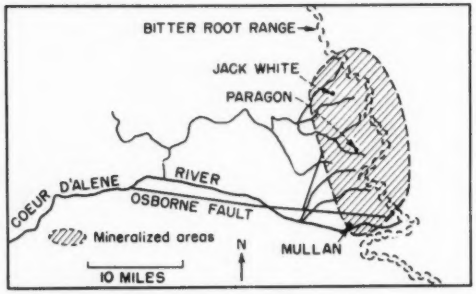


SHOWER SECTION of the new towel room contains spray nozzles replacing conventional shower heads. Temperature is controlled from master valve. Although sprays run continuously while crew is showering, this system saves hot water. Two sets of sprays at successively cooler temperatures are near exit of room.

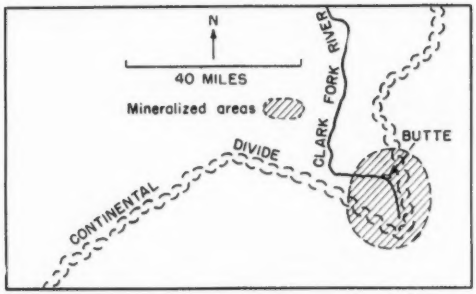
SOLARIUM. Here men can obtain the beneficial effects of 8 hours' exposure to sunlight in 30 seconds. The pacing belt, left of center in the above photograph, is provided with knobs spaced at 30-in. centers geared so that each employee will cover the distance between end pulleys in the required 30-second interval.

FIRST-AID ROOM is situated at the front end of the street-clothes section of the new dry. It provides a clean and bright area for the treatment of occasional cuts and bruises. With the foregoing modifications and additions, Bralorne Mines, Ltd., now has one of the most up-to-date change houses in Canada.

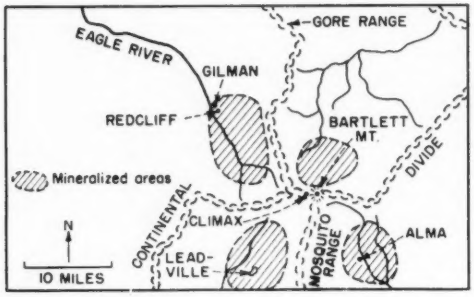
Note Mines at Curving and Junctioning Mountains . . .



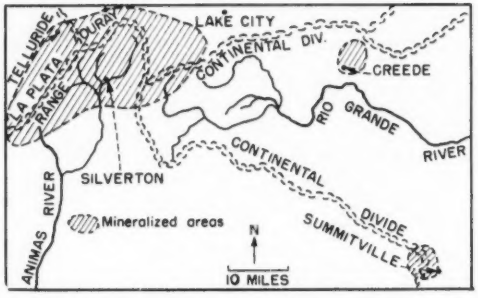
1 COEUR D'ALENES. Ideal conditions for ore deposition prevailed in this area: deep fracturing and quartzite surface deposits.



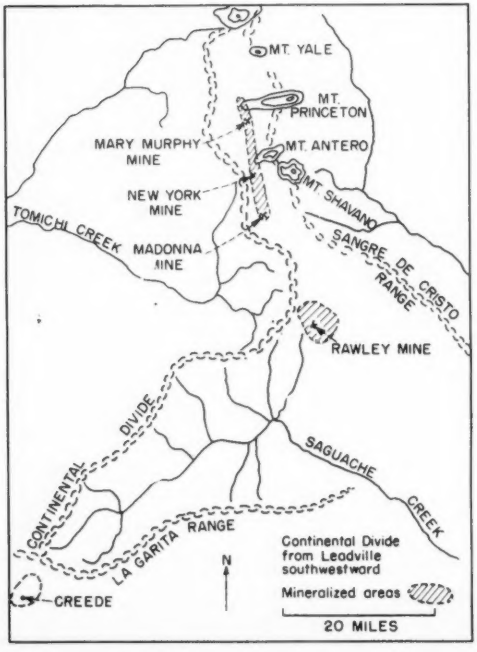
2 BUTTE. Complex earth movements in Butte mines could be reflections of nearby curving mountain structure.



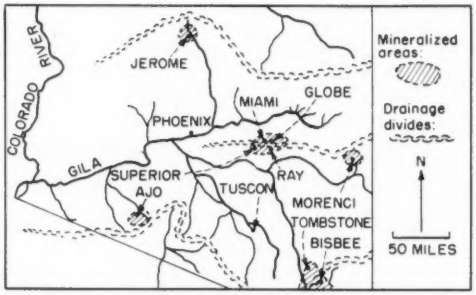
3 LEADVILLE AREA. Entire area surrounding Leadville seems to constitute a single large mineralized region.



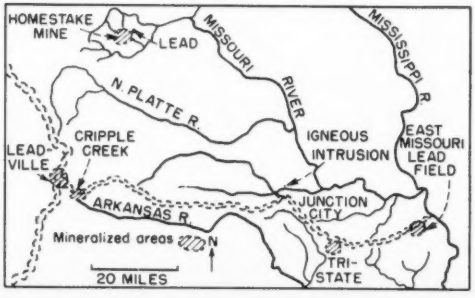
4 OURAY AREA. Southeastward from Silverton, San Juan Mts. pursue a straight course without noteworthy mineralization.



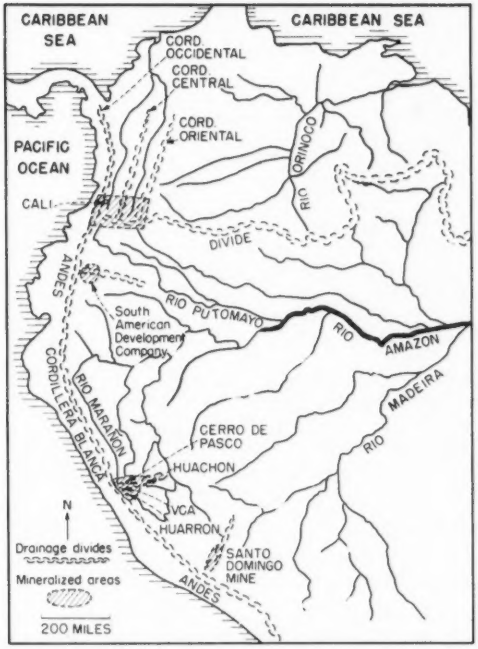
5 CONTINENTAL DIVIDE. Southwest from Bonanza, Continental Divide is straight without significant mineralization.



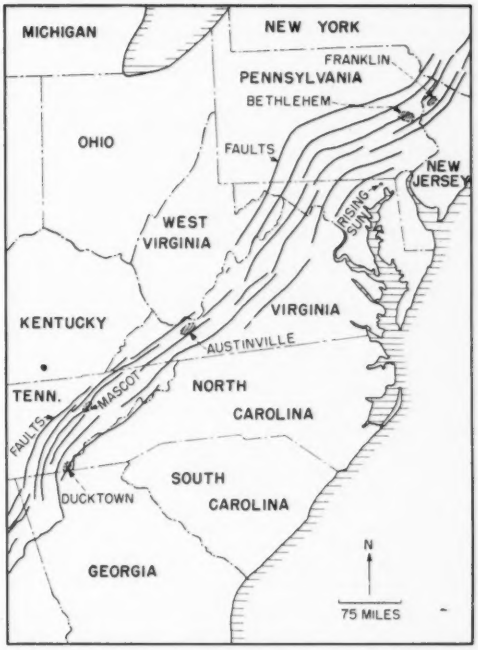
6 ARIZONA COPPERS. Granitic stock of the Miami area is actually astride a curve on ridge, not illustrated on map.



7 KANSAS-MISSOURI, BLACK HILLS. Just above Junction City, series of three basaltic plugs, or large dikes has been found.



8 JUNCTIONS OF ANDEAN mountains and western striking ridges locate mineralized areas of Peru and Bolivia.



9 FAULTS ON WESTERN flank of Southern Appalachians show Paleozoic orogens on this regional geologic map.

Can a Study of Topography Locate Undiscovered Mineralized Areas?

ELMER V. REINHARDT
Grand Junction, Colo.

AN IMPORTANT MINING geological topic today is the relation of mountain building, or orogeny, with the location of undiscovered ore sources. This article is a concise summary of my own research on this vital subject. It is my intention to show that, by the simple expedient of observing drainage maps, the approximate locations of many new mineralized areas may be found.

The belief that many mining districts are located at the crossing of two or more tectonic movements was expressed by Billingsley and Locke in 1939. Park City, Cottonwood, Bingham and Tintic are at the junction of the east-west Uinta Arch and the north-south lines of Wasatch faults; Butte is at the three-way junction of lines of fracturing; Leadville ores are associated with two fracture systems, one northwest and the other north-northeast.

Billingsley and Locke point out that junctioning and intersecting orogens (mountain ranges) create favorable areas for mineralization and it has now been found that curving orogens are also favorable areas.

Junctioning and curving veins often create favorable locations for ore shoots within mineralized areas. These veins occupy faults of varying magnitude which represent planes of weakness within the crust of the earth. The junctions and curves within the veins constitute lines of maximum weakness where ore bearing solutions have most easily penetrated. Expressed on a larger scale, orogens are compound planes of weakness; the junction of two such planes, or the curving of a single plane, has created lines of maximum weakness along which magmas have most freely forced their ways toward surface to form stocks or points projecting above the main mass of magmas. It is around these stocks that concentrations of ore are found.

B. S. Butler has shown that the majority of the mineralized areas of western United States and western Canada are grouped around the peripheries of the Colorado and Columbia River Plateaus with the exception of those in the Sierra Nevada and Coast Ranges. The Tertiary orogens surrounding these two plateau areas are reflected in the drainage patterns.

In order to investigate the relation of mineralized areas to oro-

Note Ore Concentrations Along Drainage Divide . . .

genic structure, a study of known mineralized areas, in relation to the now existing drainage systems, will be made.

Figs. 1 through 8 are pictorially drawn drainage maps of some of the largest and best-known mineralized areas of the world in tertiary orogens. The reader is asked to examine the illustrations and to note carefully the coincidence of the mineralized areas and the junctioning and curving orogens.

Paleozoic Mineralization

In North America, only three major Paleozoic orogens are now available for study, the Appalachians, the Ozarks and the Ouachitas. The others have been lost or may be considered dead.

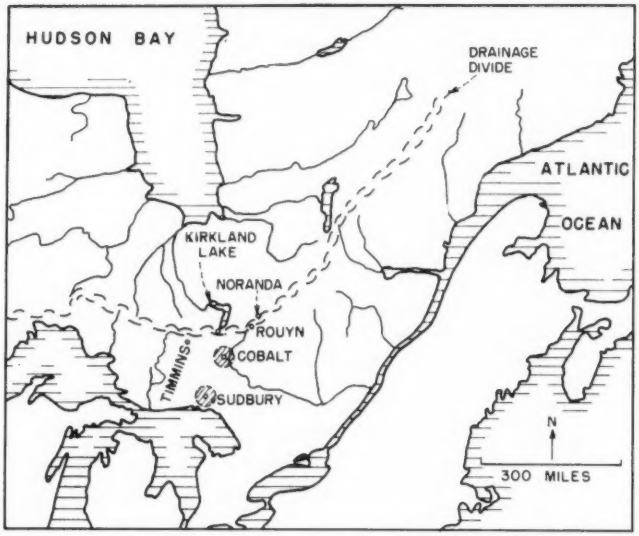
The Arkansas River has cut deeply into the Ozarks and Ouachitas, and the Northern Appalachians have been transected by the Hudson, Delaware and Susquehanna Rivers. Only in the southern Appalachians, where there appears to have been a Tertiary rejuvenation, does the drainage now reflect the orogeny. The orogenic structure of the entire Appalachian system is better reflected by faults on its western flank as shown in Fig. 9, a map prepared by the U. S. Geological Survey.

A study of the location of the mineralized areas in Fig. 9 will indicate that all the prominent hydrothermally mineralized areas of the Appalachian Range are associated with three of the four curves in the main structure. The intervening straight portions are relatively free of such mineral concentrations.

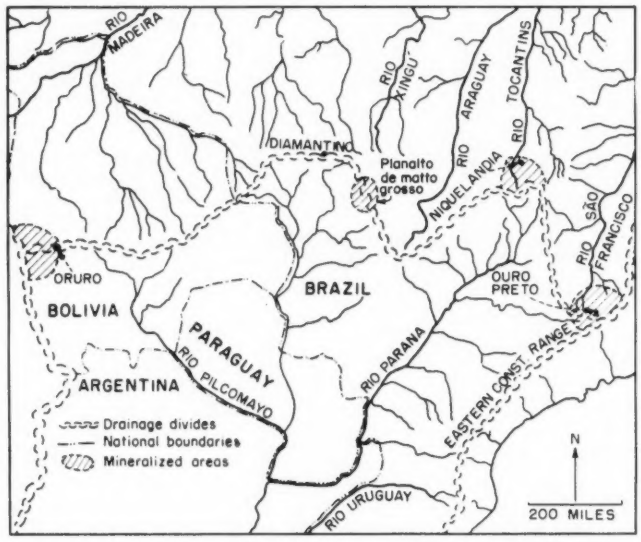
The statements concerning the Appalachians also hold true for the deeply eroded Jurassic Sierra Nevadas. The Mother Lode, although 120 miles long, has yielded its major production from the area near Plymouth at the apex of a curving fault zone, reflecting a curve in the Sierra Nevada orogen. From this curve, intensity of mineralization decreases in both directions.

At some remote Pre-Cambrian period, the whole face of the earth was one vast orogen, which now has been "lost" except for those stable land masses known as shields.

Two such shield areas are shown in Figs. 10 and 11. In the Canadian shield, the prominent mineralization occurs on or just outside of the curved parts of the drainage divide, while in the Brazilian shield the mineral areas are located at both junctions and curved sections of the drainage divide in the shield.



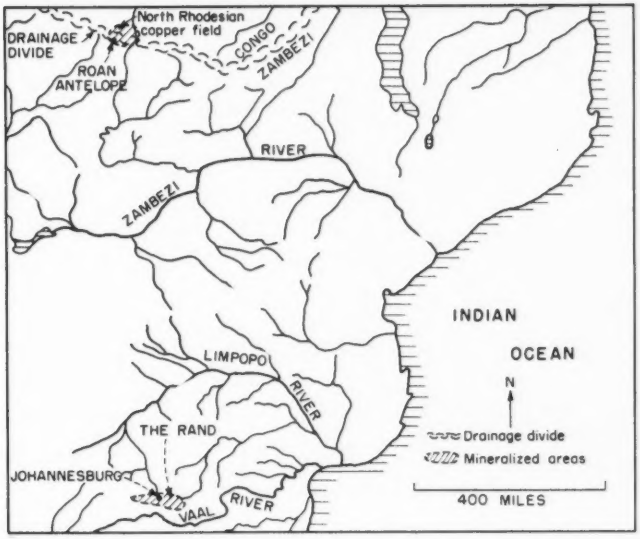
10 CANADIAN SHIELD. Over entire length of long curving divide are located more prominent gold and copper mines of eastern Canada.



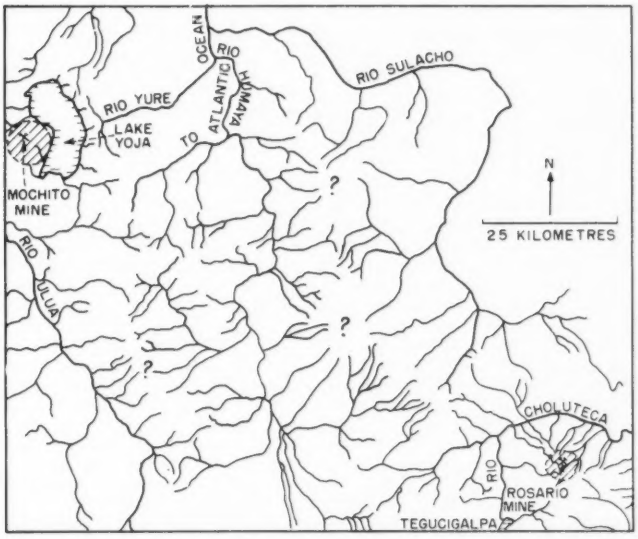
11 BRAZILIAN SHIELD. Except for quartz and pegmatite minerals, ore production, apart from the east-west drainage divide, has been meager in Brazil.

The Rand and the northern Rhodesian copper fields are shown in Illustration 12. The Rand region appears as a large structural dome with a diameter of 300 miles and an apex near Johannesburg. The structure is well reflected in the drainage pattern.

In Honduras (Fig. 13) the Tertiary orogen of the Cordillera, striking northwest, is superimposed upon a deeply eroded Paleozoic orogen striking east. For this reason, the mountains are a series of isolated domes rather than a consistent chain. The Rosario and Mochito mines are near the crests



12 THE RAND and Northern Rhodesian copper fields. Because of low relief, heavy vegetation and deep penetration of oxidizing meteoric waters, outcrops are few and poor.



13 MINES OF HONDURAS. Rosario mine is located on high point of a ridge and drainage center, from which drainage is radial in all directions. Note other likely spots.

of two of these separated domes.

Referring to Fig. 7 for a moment, it is found that the Black Hills are a structural dome as indicated by the quaquaversally dipping sediments on its flanks. Although the post-Proterozoic sediments have been eroded from the center of the dome, the original axis is still reflected in the drainage pattern. The Homestake mine is almost astride the drainage and axial crest on its northern end.

This brief notation seems to relate a Pre-Cambrian deposit to a Tertiary uplift. However, it is indicated by basal thinning of sediments on the flanks of the Black Hills that they have been a dome since Pre-Cambrian time and were merely accentuated during the Tertiary period.

Summary

In analyzing all these maps, it must be borne in mind that just as drainage is not a satisfactory guide in seeking ores in some deeply eroded, elongated orogenic uplifts, so also it is not a guide in searching for all domical uplifts.

By means of these maps and their contents I believe I can state that most of the known mineralized areas of the world are located on or near the crests of orogens or drainage divides, in the vicinity of major regional curves or at their junctions with other transverse orogens. In addition, some mineralized areas lie near the apexes of structural domes.

The locations of these curves, junctions and domes in Tertiary and Pre-Cambrian orogens may be approximated by studying drainage maps. Paleozoic structures, however, must be observed on regional geologic maps.

That Tertiary and Pre-Cambrian orogenic crests are expressed in the drainage pattern while Paleozoic crests are not may be accounted for by the following facts: (1) The Tertiary orogens are too new to have been seriously affected by erosion. (2) Most of the Paleozoic orogens are tight folds of the Alpine type without consistent, hard, crystalline cores and were, therefore, easy prey to erosion. (3) Of the many Pre-Cambrian orogens, those of the Alpine type have long since become extinct while those with gentler, broader folds and hard crystalline cores have controlled the drainage from the time of their formation to the present.

Many large mineralized areas, perhaps as rich as those mentioned in the preceding text, are as yet undiscovered; their discovery is imperative because of the rapidly dwindling ore yield from present sources. It is my belief that the study of drainage patterns and regional geology will be the ultimate guide in this search for favorable curving, junctioning and dome-like structures and thence to new ore-producing areas.

The successful application of petroleum geology is based upon a study, first of regional structures, and second of local structures. A similar approach might be applied to mining geology. It is hoped that this paper will aid in the regional study.

Photo by J. Gondos

CENTRAL CYANIDATION PLANT that serves Benguet Consolidated and Balatoc gold mining companies. It replaces the two mills destroyed by bombing during the war, having been entirely rebuilt in a new location. Ore is brought to it from the two mines through tunnels. The plant milled 50,035 tons in May. The two companies are controlled by the same interests, as before the war.

Postwar Operating Costs Higher in The Philippines

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PRIOR TO THE WAR, the operating costs of Philippine gold mines made a favorable comparison with those obtained at American and Canadian gold mines having approximately the same character. In spite of great differences in operating conditions caused by climate and relative inaccessibility from sources of equipment and supply, and more especially by the lower efficiency of the native miner in comparison with the American or Canadian miner, costs per-ton-milled were often comparable. In part, this must be credited to the excellent job of supervision by American superintendents and foremen, in part to the adaptability of the Filipino miner and his willingness to use new cost-saving equipment. In a larger measure it was due to the much lower wage scale established for Filipino mine workers, which averaged about 1.10 pesos ($0.55 U. S. currency) per 8-hour shift, in comparison with $5 to $6 per shift prevalent in 1940-41. While there is no question that, man for man, an experienced American miner was far more efficient as drill runner, timberman, or mechanical shovel operator than the lightweight Filipino, it is equally true that he was not ten times as good, as might be theoretically assumed from the respective wage scales.

Some instances of prewar costs and performance data for Philippine gold mines have appeared in the technical press that indicate they were not out of line with work elsewhere. In Technical Publication 1407, AIME, George W. Hezelwood gives total mining cost at the Balatoc mine, when producing 61,561 tons per month in 1940, at $2.53 per ton. This included all items of cost such as direct stoping, ore delivery, maintenance, and operating development. It might be compared with the mining cost, including development, of $2.48 per ton at Dome Mines in Canada in the same year, when 51,800 tons was milled monthly.

Prewar stoping costs are listed in Information Circular No. 4, "Stoping Methods and Costs in the Baguio Gold Mines," published by the Philippine Bureau of Mines in 1941. These made a good comparison with American and Canadian costs. At the Big Wedge mine, stoping costs, including labor, timber, and explosives, came to $1.21 per ton, 5,000 tons being mined per month. The Balatoc stoping cost was $0.91 per ton, 2,460 tons being mined per day. A variety of stoping methods was used. At Baguio Gold, the stoping costs for the first 10 months of 1940 were $1.91, 9,655 tons being mined per month, but these costs included all indirect charges such as general maintenance, supervision, and overhead, assessed on a proportional basis. Stoping costs at Itogon during the same period and with a mining rate of 24,300 tons a month were $1.41 per ton.

Postwar costs in the Philippines have increased sharply over the prewar period. It is hardly possible that the figures cited will be equalled for a long time to come. Every item

entering into cost has advanced, notably the labor cost. It was not to be expected that the prewar wage scale could be maintained when work was resumed after the occupation period, if for no other reason than the increase in the cost of living and resultant inflation. This was recognized immediately by the few companies that started rehabilitation work, but an attempt was made to pay only the prewar scale and give a rice allowance as a sort of cost-of-living subsidy. It was unsuccessful, and wage adjustments upward were soon found to be necessary.

Base Wage Rate at Baguio

While the base-wage rate before the war was 1.10 pesos per shift in the Baguio area, much of the work was contracted and good men were able to make a considerably higher average pay. A careful analysis of figures from the Census of the Philippines, 1939, showed that the 10,675 men employed at the Baguio Gold Mines received an average daily wage of 1.48 pesos ($0.74). The higher pay of contract men brought up the average.

In 1947, the actual base wage in the Baguio mine was 1.30 pesos ($0.65) per shift, miners having the privilege of buying ½ *ganta* (1 kilogram) of rice a day at cost. In the iron mines in southern Luzon the scale was 2.30 pesos ($1.15) plus an allowance for rice. In Surigao, the base rate was 2.50 pesos with 600 grams of rice free for an underground miner. Efficiency of the men, it was reported, was far below prewar standards.

About July, 1948, rather serious labor trouble developed in the Baguio area, spearheaded by a strike in the Zambales chromite mines. Benguet Consolidated and Balatoc mines, the most important factors in the Baguio field, granted concessions to their employees. These were affiliated with the Benguet-Balatoc workers union and the rise set the pattern for the whole area. The base wage was set at 1.50 pesos ($0.75) per shift, the union being recognized as the sole collective-bargaining agency. Two-weeks vacation leave with pay was allowed, as well as two-weeks sick leave with pay during one year of consecutive work. In effect, this increased the 1940 base pay about 50%.

This is probably an understatement. According to the general manager of the Atok-Big Wedge Mining Co., second most important gold producer in Baguio, labor costs have about doubled compared with prewar. The general superintendent at Surigao Consolidated declares that the average daily wage at his mine was 2.74 pesos ($1.37) during 1948, but in February, 1949, it was in excess of 3 pesos ($1.50), after taking into consideration the losses sustained by the company on the sale of rice and other prime necessities. The prewar base wage in Surigao was about 1.10 pesos ($0.55) per shift.

Comparison of operating costs of the few Philippine mines that are producing again shows a substantial increase in 1948 over 1940. Not all of this, of course, can be attributed to labor. The cost of supplies has risen sharply, including timber and fuel oil. All the mines are operating at less than rated capacity, with an excess of indirect and overhead costs to distribute over the subnormal tonnage, and this distorts the unit cost figure unduly. Only over-all figures are available.

Over-all costs for all companies exceed in considerable degree the costs cited above. These necessarily include heavy charges for depletion, depreciation, and amortization of the expenses of rehabilitation, and their inclusion would serve no useful purpose for comparison.

Comparison of Operating Costs, 1941 and 1948, for Five Producing Mines in Philippines

BENGUET CONSOLIDATED

	Jan.-June, 1941	Jan.-Dec., 1948
Tons milled	238,295	165,629
Mining, milling, general overhead, per ton*	$4.53	$6.56
Percent increase, 45%		

BALATOC MINING CO.

Tons milled	391,257	230,502
Mining, milling, general overhead, per ton*	$3.85	$5.73
Percent increase, 49%		

*Taxes, depreciation, depletion not included.

ATOK-BIG WEDGE MINING CO.

	Jan.-Dec., 1940	Jan.-Dec., 1948
Tons milled	75,640	148,000
Operating cost per ton*	$6.41	$8.20
Percent increase, 29.5%		

*Includes mine production tax and general overhead but not depreciation and depletion.

MINDANAO MOTHER LODE

	Jan.-Dec., 1940	Jan.-Dec., 1948
Tons milled	68,487	68,700
Ore production, milling, general overhead*	$5.07	$11.75
Percent increase, 130%		

*Includes administration and general expense, but not taxes, marketing expenses, depletion or depreciation.

SURIGAO CONSOLIDATED

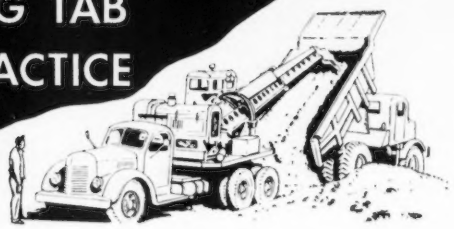
Tons milled	117,000	72,851
Mining, milling, mine general expense*	$4.21	$6.90
Percent increase, 64%		

*Does not include marketing expense, taxes or depreciation.

Sale Price Above $35

Fortunately the Philippine gold mines are able to sell their bullion on the open market in Manila at substantially higher prices than the statutory price of $35 per ounce. In 1948 the Benguet-Balatoc companies realized an average price of about $44.60 per ounce, and Atok-Big Wedge about the same. Recently the gold price has been higher and sales have been reported at over $50 per ounce. This increase of over 40% has been urgently needed by the producers to compensate for the higher costs. The ability to make such sales in Manila should in theory limit the export of gold. It is easy to smuggle the metal out, however, and one suspects that no great effort is made to interfere with this traffic.

KEEPING TAB ON PRACTICE



Mesabi Winter Stripping Provides Use for Gradall. Last month we described the trick of using the engine exhaust to heat the box of heavy-duty trucks in winter to prevent muck from freezing and building up inside in a way that cuts down carrying capacity. Where the size of the job or the nature of the material does not warrant going to heated boxes, Warner & Swasey's Gradall has been found useful on the Mesabi. In this application, the Gradall works essentially as a piston-operated back-hoe, mounted on a truck for portability. The "hoe" is attached by an actuating linkage to the end of a 24-ft. boom which is so mounted as to permit almost universal motion. (The Gradall can use a number of different tools interchangeably, all attached in this way, with which it readily does precision grading, contouring, ditching and other specialized operations formerly limited to slow and expensive hand labor).

The control of the tool is very sensitive, permitting dexterity in manipulating it within the narrow dump body of the truck.

In winter stripping on the Mesabi, top surface-cuts in clay cause the most trouble, due to the high moisture content of the material, which freezes on contact with the steel boxes. Paint rock, with a high alumina content and inherently sticky in itself, sets up like concrete when frozen. Under the sharpest temperature conditions six trips to the dump without cleaning could result in a full, solid-frozen truck load.

Conventional truck-cleaning is long and tedious, with several men assigned to the dump with hand tools. One operator says that in very cold weather it takes 30 min. to 2 hr. to clean a truck with hand labor, using the driver and another man.

A truck in bad shape may be tied up for an hour as the crew works under adverse weather conditions. On a busy dump, boxes cannot be cleaned regularly, and the trucks drop out of line only once in every three to five trips for cleaning.

In using the Gradall, it is located on the dump and is said to handle the cleaning job efficiently and speedily, so that all trucks are cleaned on a regular trip schedule. A truck backs to the Gradall, and with a 5-ft. blade mounted on the boom, the body is stripped clean in six to eight passes. In a test, ten 20-ton Euclids in dirty condition were handled consecutively in 35 min., or 3¼ min. per truck.

This means of cleaning trucks regularly has in cases also eliminated truck-spraying which goes with hand-cleaning. Truck bodies, when cleaned to bare metal, are normally sprayed with a brine solution, calcium chloride mixture, or with fuel oil, to deter the setting-up of loads. When the Gradall is used, such spraying is not needed and time is saved, also the spray set-up, including the man who operates the spray, boiler, and water and fuel supply.

However, the increase in the time the truck is available for hauling is more important than the labor saved. Over-all savings are reflected in the records of one stripping project which acquired a Gradall in midwinter. When the 10-ton Euclids were hand-cleaned, the yardage handled per shift was 5,000-5,200. When the Gradall took over the cleaning, the yardage went to 6,700 per shift. In another Mesabi operation, where thirteen 24-ton Euclids were servicing a 5-cu. yd. shovel, the use of a Gradall made it possible to eliminate three of the trucks.

The machine has also been used for cleaning dump trains. The typical train of five or six 30-cu.yd. side dump cars backs into the dump and discharges on one side. The cars are then reversed and the waiting Gradall travels parallel to the track at a distance of 17 ft. from inside fender to near rail. The machine goes to work as soon as the farthest car has been reversed, and successively cleans each car body.

As with truck cleaning, the machine levels out scrapings between loads, until the accumulation is big enough to warrant the use of a scraper.

Economy in Churn Drilling. A western open-pit copper operation has discontinued its former practice of discarding churn-drill bits which had been reduced to 32 in. or less by repeated sharpenings. Now two 32-in. remnants are welded together in the machine shop to produce a rebuilt bit at an approximate cost of $18 per bit. This compares with new 500-lb. bits, 5 ft. long, costing approximately $79 to $100.

Cement Floors in Fill Stopes. Operators are generally familiar with the use of concrete flooring instead of timber in cut-and-fill stopes. However considerable interest here and abroad has been expressed in the following unique modification of this method. Instead of pouring mixed concrete over the gob, one western mining company levels off the gob, rakes out the boulders, and sprinkles dry cement over the fill at the rate of 1 sack per 12 sq. ft. The cement is then mixed into the gob surface with picks, and sprinkled with water. After 48 hr. the surface sets sufficiently to permit scraping operations. Fill which slopes as much as 20 deg. can be surfaced by this method. More cement than specified above can be used for areas requiring heavier surfaces, such as scraper paths. Concrete flooring is especially desirable because it does not introduce wood scrap into the mill feed.

Another Throwaway-Type Bit? Timken will build a new line of single-use detachable bits in a sufficient number of gages and designs to satisfy the prospective market, just as soon as it decides on the best type of union. According to its recent announcement, the company for three years past has been seeking a more satisfactory union than the present standard patented thread construction, the only disadvantage of which, it says, is the cost of manufacture. Many ideas have been tried in the course of this work, on some of which patents are pending.

The matter of a satisfactory union between detachable bit and rod is giving more than one manufacturer and user something to think about. An outgrowth of this is to be noted in the work that is being done with bits forged right on the steel and then tipped with carbide inserts (*E&MJ*, Aug., 1949, p. 80). Any return to nipping would hardly look like progress, but then, with carbide tips, there would be less steel to nip. This development will spur the search for the best possible union.

Progress in Diesel Haulage Underground. Hubert Davies & Co., Johannesburg, have replied, upon our inquiry, that the 150 diesel mine locomotives (Ruston) which they recently said were in service in South Africa, are working in gold mines, copper mines, and other base-metal mines—not in coal mines. This is in strong contrast with the use of two or three diesel locomotives underground in the United States. Most of the gold mines in South Africa provide ventilation far in excess of the requirements for diluting the exhaust gas. The United States does have some metal and non-metal mines where diesel trucks are working in large well-ventilated open stopes and gangways. Hubert Davies adds that they have the order for the first two diesel locomotives for service in coal mines in South Africa. The electrical and exhaust equipment of these units has all been flame-proofed.

MARKETS—Trends and Prices (Continued from page 69)

Copper Statistics

Following is a summary of the copper statistics reported by members of Copper Institute, figures in short tons:

UNITED STATES

Production	Jan.	Feb.	March	April	May	(a)June	July
Crude, primary	53,066	58,751	79,256	75,703	70,703	63,639	56,630
Crude, secondary	16,372	18,190	17,867	15,886	10,555	8,412	6,005
Totals	69,438	76,941	97,123	91,589	81,258	72,051	62,635
Refined	78,298	80,275	88,165	93,873	98,139	92,118	85,638
Deliveries, refined	94,070	97,861	113,154	76,134	32,566	45,653	45,316
Stocks at end, refined	91,053	83,841	68,450	76,494	128,441	166,925	212,817

OUTSIDE UNITED STATES

Production	Jan.	Feb.	March	April	May	(a)June	July
Crude, primary	112,314	106,175	119,825	110,734	113,945	110,500	98,475
Crude, secondary	891	967	904	1,268	581	681	488
Totals	113,205	107,142	120,729	112,002	114,526	111,181	98,963
Refined	96,210	87,004	100,686	96,513	96,743	97,449	81,277
Deliveries, refined	77,546	74,327	85,750	75,424	79,644	86,475	71,333
Stocks at end, refined	172,909	165,462	156,790	159,852	165,271	162,798	161,299

(a) Corrected figures.

Official London Prices

Since Dec. 18, 1939, the British Ministry of Supply has named maximum delivered prices for the major nonferrous metals. Delivered prices for consumers in the United Kingdom as of July 30, 1949:

	Per Long Ton £	s.	d.
COPPER:			
Electrolytic, high conductivity	107	10	0
Fire refined, high conductivity	107	10	0
Fire refined, high grade	107	0	0
Fire refined, min. 99.7 percent	106	10	0
Fire refined, min. 99.2 percent	106	0	0
Hot rolled black wire rods	113	10	0
LEAD:			
Soft, foreign, duty paid	87	5	0
Soft, Empire	87	5	0
English, refined	88	15	0
ZINC:			
Foreign (G.o.b.) duty paid	63	10	0
Domestic (G.o.b.)	63	10	0
Prime Western and debased	63	10	0
Refined and electrolytic	64	5	0
Minimum 99.99 percent	65	15	0
TIN:			
Ingot, 99 percent	569	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

(August 31, 1949)

Aluminum, ingot, 99 plus percent, lb. (base price)	17c.
Antimony, spot, lb., 5 tons and up but less than carload, in cases	41.73c.
Bismuth, ton lots, lb.	$2.00
Cadmium, commercial sticks, delivered, lb.	$2.00
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	$1.80
Indium, troy oz.	$2.25
Nickel, electrolytic cathodes, lb., f.o.b. Port Colborne, (a)	40c.
Magnesium, 99.8 percent, carloads, lb., producer's plant	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots), troy oz.	$69.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$72.00@$75.00
Selenium, 99.5 percent, lb.	$2.00
Silicon, minimum 97 percent, spot, carloads, lb.	16.50c.
Tellurium, lb.	$1.75 nom.
Thallium, 100 lb. or more, lb.	$15.00
Titanium, 96 to 98 percent, lb.	$5.00@$6.00

(a) Includes U. S. duty

METALLIC ORES

Beryllium Ore, 10 to 12% BeO, per unit	$25.00@$35.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry 48% Cr_2O_3, 2.8 to 1 ratio	$34.00@$35.00
48% Cr_2O_3, 3 to 1 ratio	$38.00@$40.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$7.66
Mesabi bessemer	$7.35
Old Range non-bessemer	$7.45
Mesabi, non-bessemer	$7.20
Lead (Galena), 80 percent, Joplin, Mo., ton	$192.91
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese subject to premiums and penalties, 80c. to $1c., c.i.f. U. S. ports. Quoted prices largely nominal.	
Molybdenum Ore, 90% per lb. of MoS_2 f.o.b. mines	54c.
Tantalite, 60% concentrate, per lb.	$2.00@$2.75
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, duty paid (a)	$19.00@$21.00
Domestic, scheelite, 60 percent and upward	$28.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$57.00

(a) Nominal

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots, delivered	6c.
Cobalt Oxide, 70 to 71 percent, lb., ceramic grade	$1.38@$1.40½
Copper Sulphate, 100 lb.	$7.00

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of contained Be	$24.50
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	18.60c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$172.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo, contained	$1.10
Ferrosilicon, 50 percent, per lb. of contained Si	11.3c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$2.25
Ferrovanadium, per lb. of V delivered	$2.90
Silicomanganese, 1½ percent C, per lb. contracts	8.6c.
Spiegeleisen, per long ton, 19@21%	$65.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960@$1,050
Crude No. 2	$492@$550
Spinning fibers	$232@$475
Shingle fibers	$95.50@$141
Paper stock	$78.50@$88
Waste	$58
Shorts	$27@$52
Vermont, f.o.b. Hyde Park	
Shingle stock	$97.00@$107.00
Paper stock	$68.50@$85.00
Waste	$51.00
Refuse or shorts	$25.50@$46.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$11.50@$12.00
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$9.00@$9.50
Bauxite, long ton:	
Domestic, crude, 50 to 52 percent (not dried)	$4.00@$5.00
Domestic, chemical, 55 to 58 percent	(a)$8.50@$9.50
Domestic, abrasive, 80 to 84 percent	$18.00@$18.50
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, airfloated bulk	$8.50@$9.50
North Carolina ceramic grade	$18.00@$20.00
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh	$18.50
Glass spar, white, 20 mesh	$11.75@$12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70 percent, all rail movement, ton	$37.00
Acid 97% concentrate, bulk, ton	$43.50
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$30.50@$31.00
Mica—Domestic f.o.b. mines, Punch, 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 70 to 75c.; 2 x 2 inch, $1.10 to $1.28; 2 x 3 inch, $1.40@$1.50; 3 x 3 inch, $1.70@$1.80; 3 x 4 inch, $2.10; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $135@$165 per ton. Bulk sales, dry ground, $40@$80 per ton. Scrap, $21 and up.	
Ocher, Georgia, ton, in sacks	$24.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	(a)12@14c.
Sulphur, Texas, mines, long ton	$18.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50@$20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50

(a) Nominal

IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces	$46.00
Steel, f.o.b., Pittsburgh billets, net ton	$52.00
Structural shapes, 100 lb.	$3.25

WASHINGTON REFLECTIONS

McGraw-Hill Washington News Bureau

Mine Subsidy Chances Seem Even Slimmer

Barring a miracle, the mining industry will not get any subsidy legislation out of Congress this year. The reasons for this are three-fold.

First: The Administration will not accept anything but its carefully-worded substitute for the O'Mahoney bill (S.2105).

Second: Congress in all probability will not accept the Administration's version of the bill. Main deterrent here is that the new measure establishes a "buffer stockpile" which could dump metals or minerals on the open market at any time and at almost any price. Also, many people think the Administration is given too much latitude in devising the rules and regulations under which the proposed subsidy would operate.

Despite the "buffer stockpile" language, the Senate Interior and Insular Affairs Committee passed the Administration's bill on Aug. 23, and sent it to the floor of the Senate after making several amendments. One such, would hold back somewhat the impact of the buffer stockpile on the free market. Another would give exploration contracts to base metal mines whose production of copper, lead, and zinc per month was under 100 tons. It would provide for Government payment of "one-half of the total reasonable costs of all tunnels, shafts, winzes, and raises in such mines, if the application discloses that there is a reasonable promise of developing unknown or undeveloped sources of metals or minerals."

One other amendment would provide that maximum or minimum prices paid for "conservation" production would allow for depletion and depreciation in computing costs of operation or maintenance.

These amendments are not acceptable to the Administration, and would be the cause of a Presidential veto should the bill reach the White House.

The Administration-written version of the O'Mahoney bill is a completely new development of President Truman's proposal to help out in exploration for new mineral deposits. This version, officially announced Aug. 16, would base all help to the mining industry either upon "conservation" or "exploration."

Either type of help would be put through only after a complete investigation and report had been made on the individual project by a group of qualified technicians. In an exploration project, the examining experts would certify whether the project offered reasonable promise of discovering unknown or undeveloped sources of ores or minerals. In the case of a project to "conserve," the experts would have to certify that the property would be in such condition, lacking Federal aid, that it could not be economically or technically rehabilitated in a future emergency.

Once given a favorable report by experts, the Government would help conserve a valuable mineral deposit by: 1, participating in the costs of maintaining the property in standby condition; or 2, purchasing all or any part of the metals or minerals resulting from production from such a deposit.

All metals and minerals purchased under these assistance contracts would be placed in a "buffer stockpile" under the control of the Administrator of General Services, the new Government agency which combines War Assets, Bureau of Federal Supply, and Public Works.

This is the clause which many of the Congressmen in opposition disagree with. The reason is that the buffer stockpile would be a very effective depressant to metal and mineral markets. The administration insists it would be a "leveler."

The Administrator of General Services, under the new bill, would first notify the Munitions Board of any inventory of strategic metals or minerals held. After 60 days, provided the military fails to ask for them, the holding administrator could sell the materials on the open market: 1, "if and when open market prices will return to the Government at least the price paid by the Government for the metals or minerals," and, 2, "only in such quantities as will not depress the market."

Travis Drops Reds As Mine, Mill Complies

Early in August the National Labor Relations Board notified the Mine, Mill and Smelter Workers Union (CIO) that their non-Communist affidavits had been accepted, and that the union was now eligible to use the facilities of the Board. Chief benefit of this move to Mine, Mill will be that it can now be certified to take part in plant elections to decide bargaining agents. Lack of this standing has cost Mine, Mill representation in several plants.

This action cleared up a question that has been agitating mine labor discussions for years. In signing his affidavit, Maurice Travis, Mine, Mill secretary-treasurer, announced his resignation from the Communist Party. Up to then, he had always skillfully dodged the question of Party membership. Travis' statement made most interesting reading.

"This has not been an easy step for me to take," he said. "Membership in the Communist Party has always meant to me, as a member and officer of the International Union, that I could be a better trade unionist; it has meant to me a call to greater effort in behalf of the union as a solemn pledge to my fellow-members that I would fight for their interests above all other interests."

Let us, at this point, refer those interested to *E&MJ* for July, 1947, wherein we cataloged the way in which Communists had unhesitatingly put Russia's interests ahead of everything. Travis goes on:

"Therefore, I want to make it crystal clear that my belief in Communism is consistent with what I believe to be the best interests of the members of this Union and the American people generally."

Outlining a few of the standard Communist catch-phrases, Travis said, "Despite my resignation from the Communist Party, I will continue to fight for these goals with all the energy and sincerity at my command."

Overtime on Overtime Ended By New Law

Time-and-a-half pay for night work, Saturdays, Sundays and holidays is now recognized as true overtime pay under the Wage-Hour Law.

President Truman on July 20 signed H.R. 858, a bill specifically approving in law overtime pay practices which were acceptable by the wage-hour office until the Supreme Court's upset decision in the Bay Ridge stevedoring case a year ago. In that decision, the court held that extra pay for working nights and at other unusual hours was not "overtime." Real overtime, the court said, is extra pay for working longer than a specified period of time or more than a specified number of days.

Thus, workers who were paid time and a half on a holiday or for a night shift, were entitled to "overtime on overtime" if they worked beyond 40 hours during the week. The time and a half was not counted as overtime, and the extra half pay to be averaged out and added to the base rate to determine the "regular rate" on which real overtime would be due.

This is now corrected in the amendments to the Wage-Hour Law contained in H.R. 858. They provide that time-and-a-half pay for work be-

yond a regular work day or work week, or for holidays and weekends or for the sixth or seventh day of the work week is real overtime which may be credited toward any overtime pay due under the Wage-Hour Law. Also, the extra pay need not be included in computing the "regular rate" on which overtime must be based.

The new law has retroactive application, thus wiping out any pending or potential claims.

Government Aid Looms For Taconite Plant

Four months ago the Administration asked the steel industry to start conserving rich iron ore in the Minnesota ranges. Discussions centered upon the two main methods of conservation: Importation, and beneficiation of low-grade ores.

From a security standpoint, the development of plants to treat low-grade ore was the more important of the two ideas. The Snorkel submarine, in a war, could throttle imports, while beneficiation at home would add to the supply of the all-important ore. There is agreement here—also a stalemate.

Oglebay, Norton and Co., of Cleveland, is ready to try the beneficiation scheme—but can't borrow the first $50 million needed on terms better than a 10-year amortization. Officials of the company explain that they would need about a 30-year loan to make the plan pay off. It is not the profit so much as it is the fact that initial costs would be so high that price competition with the high-grade Mesabi shipping ores would be impossible if mortgage payments were too stiff.

Although RFC's hands are tied now by a 10-year limit on loans from its $2,500,000,000 stock, there is legislation pending to eliminate the maturity limit. The bill, sponsored by Senators Maybank and Spence, is gathering dust on the Senate Banking and Currency Committee shelf. The Committee has heard some testimony on the bill, including representatives of Oglebay, Norton, but the RFC sub-committee, which would have to pass on the measure, has not even seen it yet.

The Administration promised steelmen that once the beneficiation plans were made and ready to go, it would help out all it could on the money angle. But little has been done to build a fire under the Senate Committee, which is vague about future action on the bill.

Oglebay, Norton's plan involves the initial construction of a 2,500,000-ton beneficiation plant, with railroad and other utilities designed for an ultimate capacity of 10,000,000 tons. The first unit would cost about $50 million, the complete installation about $150 million. The plant would concentrate low-grade taconite by a magnetic separation process.

NEW USBM REGIONS, with decentralized control, are part of Bureau's reorganization to enable better service for local commodity problems and smoother operation generally.

USBM Decentralizes Control of Affairs

A reorganization of the U. S. Bureau of Mines, designed to decentralize administration of the common aims of the agency from Washington to the field, is under way.

Instead of division heads in Washington directing Bureau operations in the field, with little or no regional responsibility for catering to the problems of local industry, the new concept will give directors of eight regional establishments almost complete autonomy within their area. Each regional director will be answerable only to the director of the Bureau, who will remain in Washington.

Thus, considerably more attention will be directed to regional commodity problems than has been the case in the past. Each regional director will have direct responsibility for all the Bureau's activities in his territory. The regional administrators will be assigned responsibility for all fiscal, personnel, and administrative matters which can be delegated from Washington without interfering with conflicting statutes or higher authority.

Through this regionalization of workaday aims of the Bureau, the Washington headquarters will be relieved of the infinite details of administration that it has heretofore carried on. In the words of James Boyd, Director of the Bureau, "administrative procedures will be stepped up, and the efficiency of the Bureau will be improved. The Washington headquarters is to be a staff office, which will develop direction and purpose of all the Bureau's activities, and will provide a contact between the Bureau, the other departments of Government, and Congress."

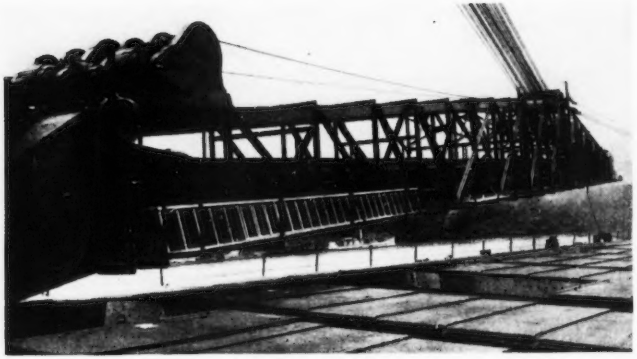
To accomplish this melding of effort, the Washington office is being organized into three commodity and one administrative divisions. For purposes of organization, health and safety is considered a commodity. The Fuels and Explosives Division will coordinate the activities in coal, petroleum, synthetic fuels, helium and explosives. The Minerals Division will be subdivided into the most convenient branches to give proper weight to the important mineral commodities. Each commodity branch will be required to know the developments in that industry both at home and abroad. Each will be in charge of writing a Minerals Yearbook chapter. Each will be responsible for developing an over-all program in that commodity sphere. Contacts between the Washington commodity branches and field offices "will be direct and intimate."

In addition to the commodity divisions, a chief metallurgist, a chief mining engineer, a chief economist, and an office of Air and Stream Pollution have been established as special consultants and advisors to the director. Also under the triumvirate composing the director's office (assistant director and an assistant to the director), are a chief counsel and an office of mineral reports.

The regions (see map) break the United States into seven pieces, with Alaska constituting an eighth part. A ninth region, to be located in Washington, will cover foreign mineral commodities, their production, consumption, and development.

Director Boyd, in a letter to all members of the staff, stated the new order of procedure as flatly as is possible. He said, in explaining the new regional set-up, that "We are by no means a control agency. Our function is to discover and present the facts and to encourage, through the preservation of these facts and contact with the industry, the improvement in its efficiency, health, and well-being."

NEWS OF THE INDUSTRY



LARGEST BOOM ever installed on a ship is this nickel alloy steel unit on the "Crispin Oglebay" Great Lakes Freighter built by American Ship Building Co., Cleveland, Ohio. The ship was converted from a bulk freighter to a self-unloading type of vessel. Ore, coal or limestone is unloaded by chutes, conveyors and elevators on to conveyor on the boom which swings over the side of the ship. Boom is 250 ft. long with a 25-ft. extension chute. Open truss is 17 ft. deep.

Photo from Nickel Topics.

Mining Congress Offers Full Program at Spokane

Mayor Meehan to Open Meeting

The program for the 1949 Metal Mining Convention of the American Mining Congress to be held at Spokane, Washington, September 26-28, is rapidly nearing completion. Nine sessions will be given over to discussion of problems of the metal and non-metallic mining industries.

The first session will feature discussions on **"Prospects for Non-ferrous Metals"** by Dr. Joseph Zimmerman, Editor-in-Chief, Daily Metal Reporter; **"The Status of Strategic Minerals"** by John D. Bradley, vice president, Bradley Mining Co., San Francisco; **"A Free Market for Gold"** by Joseph Stagg Lawrence, vice president, Empire Trust Co., and **"The Future of Silver"** by Ross D. Leisk.

In the afternoon, labor relations and mining legislation will be considered. James K. Richardson, manager, Utah Mining Association, will outline **"Significant Developments in Mining's 1949 Wage Negotiations,"** and **"The Communist Menace in Labor Unions"** will be described by Robert E. Vivian.

This session will be highlighted by an address by Senator Pat McCarran of Nevada, chairman of the Conference of Western Senators, on the subject of **"Mining Legislation in the 81st Congress."**

Another afternoon session will be devoted to milling progress. At this session, Nathaniel Herz, chief metallurgist, Homestake Mining Co., will present **"A Perspective of Milling Operations."** **"Improved Flotation from Crushing Plant Change"** will be described by J. J. Burns, mill superintendent, Edwards Division, St. Joseph Lead Co., and will be discussed by E. B. Jennings, general superintendent, Universal Exploration Co., and the **"New Sink-Float Plant at Sullivan Concentrator"** will be described by H. R. Banks.

Tuesday—At a morning session principles applicable to tax and new mining ventures and producing mines will be discussed and industry viewpoints on exploration and production incentives will be presented.

Special attention is being given small mine operators on the afternoon of the second day. The following will speak on the subjects noted: Roger V. Pierce, consulting mining engineer, Salt Lake City, on **"Mechanization"**; J. C. Kieffer, manager, Spokane-Idaho Mining Co., on **"Labor Relations"**; James A. Hogle, Jr., assistant general manager, Rico Argentine Mining Co., on **"Accounting"**; Dr. Francis A. Thomson, president, Montana School of Mines, on **"Functions of the Mining Engineer"**; and Carl J. Trauerman, secretary-treasurer, Mining Association of Montana, together with James Newton, regional administrator, and Ellsworth Y. Dougherty, mining engineer, Securities and Exchange Commission, on **"Financing."**

Operating papers on September 27 will feature: **"Diesel Engines for Auxiliary Power on Electric Locomotives at Ajo"** by Alfred T. Barr, mine superintendent, Phelps Dodge Corp., and a further discussion of this subject by H. L. Garrity, superintendent of mines, Kennecott Copper Corp.; **"Conveyor Belt Transportation"** by Russell G. Haworth, assistant general manager, Potash Company of America, with a discussion by C. A. R. Lambly, general superintendent, Pend Oreille Mines and Metals Co.; and **"Large Diameter Churn Drills"** by William H. Goodrick.

Another operating session on Tuesday will feature diesel power underground, shaft-sinking, and applications of various types of rock drill bits. **"Diesel Power Underground"** will be discussed by S. S. Clarke, general superintendent of mines, Eagle-Picher Mining & Smelting Co., Cardin, Oklahoma, and Jack East, engineer in charge, U.S. Bureau of Mines, Denver. **"Sinking Bunker Hill and Sullivan's Inclined Shaft"** will be described by Joseph Gordon, assistant mine foreman, Bunker Hill & Sullivan Mining & Concentrating Co. Participating in symposiums on insert bits and single pass bits.

Sessions on Wednesday, September 28, will be devoted to public land policies, the finding of mines in the future, non-metallic mining in the Northwest and health and safety.

A symposium on proposed revisions in the mining laws will be participated in. **"How Mines of the Future Will Be Found"** will be outlined by Edward H. Wisser.

Included in the presentations on safety and health will be an address on **"Handling the Underground Dust Problem"** by Jack Warren, assistant ventilation engineer, Anaconda Copper Mining Co., and a paper on **"Advances in Mine Safety"** by Robert F. Wilson, supervisor of safety, Oliver Iron Mining Co. Sheldon L. Glover, will outline problems involved in **"Non-metallic Mining in the Northwest"**; and **"Roof Bolting"** will be discussed by E. A. Morgan, U. S. Bureau of Mines, Denver.

Five New Plants Will Process Powdery Iron

Five new sintering plants will be built to recover the large amount of iron present in flue dust and sludge obtained from dustcatchers and gas washers in blast furnaces. Completion of the new facilities should add 1,800,000 tons a year to the high-grade iron ore available for blast furnaces.

Plants comprising this United States Steel Corp. development will be built at the Gary, Ind., and South Chicago plants of Carnegie-Illinois Steel Corp., at the Edgar Thomson and Carrie Furnace plants of the same company in the Pittsburgh district, and at National Works of National Tube Co., McKeesport, Pa.

Are the Non-Communist Affidavits Merely Slips of Paper? NLRB Says It's Up to Department of Justice

If the Government is going to raise any question about the validity of affidavits filed by officers of the CIO Mine, Mill and Smelter Workers denying Communist membership or sympathies, such action will have to come from the Justice Department.

That is the position taken by the National Labor Relations Board, whose policy is to accept affidavits "on their face" and not examine the truthfulness of them. NLRB relies on the technical language in the Taft-Hartley law which only requires that non-Communist affidavits be filed by union officers before a union may get assistance from the board in elections or unfair labor practice cases. The law doesn't say that the affidavits must be true.

The penalty Taft-Hartley provides for false affidavits is Section 35 (A) of the criminal code—making a false statement to the Government in seeking benefits. The maximum penalty is $10,000 fine and 10 years' imprisonment. However, it's up to the Justice Department to prosecute.

The Justice Department has a small unit handling Taft-Hartley matters. Instances of suspected falsification have been called to its attention, but as yet no action has been taken against any union leader.

Most prominent is the case of Max Perlow, secretary-treasurer of the CIO Furniture Workers. He resigned from the Communist Party and signed an affidavit, while at the same time publicly proclaiming he was not changing his belief in Communism. The signer of an affidavit swears he is not a Communist and doesn't believe in Communism.

NLRB insists on affidavits from all persons listed as "officers" in the union constitution. As long as all Mine-Mill officers sign affidavits, NLRB will not question the validity of the union's compliance.

It's a different matter if the union rejuggles its officers and uses some subterfuge like that resorted to by the CIO Food Workers. The president of the union, Donald Henderson, resigned and was appointed to a newly-created post—National Administrative Director. There is no such position in the union constitution. NLRB has refused to consider the union in compliance unless Henderson signs an affidavit or proves to the board that he is not still an "officer" of the union.

Maurice E. Travis, Mine-Mill secretary-treasurer, was accused by a CIO investigating committee two years ago of "continuously dealing" with the Communist Party in shaping Mine-Mill policies.

Demonstrate Oil Shale Mining at Rifle

Announcing that a public demonstration run will be made in the experimental oil shale mine near Rifle, Colo., from September 7 through October 4, James Boyd, director of the Bureau of Mines, has invited mining engineers, equipment makers and any other interested persons to be present.

For two weeks the top level will be worked, then the bench level for two weeks. On September 20 and 21, visitors will be able to see both types of operations on successive days.

Not only will unique equipment and practices be demonstrated in the month long test run, but a new determination will be made of the direct costs of mining oil shale. Earlier test runs have achieved direct costs of less than 50c. per ton and production rates exceeding 100 tons per man shift underground.

New Metals Group Is Formed in Southwest

Representatives of mining operations in New Mexico, Arizona and West Texas recently formed the Western States Chamber Metals Association at a meeting held in Silver City, N. M. Purpose of the organization is to help fight the situation facing the basic metal industry in the Southwest which has brought about increasing numbers of shutdowns.

Claude Brooks, manager of the Globe, Ariz., Chamber of Commerce, was named president of the new organization. William Upton, general manager of the Grant County State Bank, Bayard, N. M., was named vice president. Jack Brage, Miami (Ariz.) business man is secretary-treasurer.

The organization will solicit funds from chambers of commerce in the West to be used in seeking an import duty on foreign metals, a government guaranteed price for domestic copper, zinc and lead, and a public works program for unemployed workers.

Well Drillers Find Uranium in Italy

Report comes in that an important uranium carbonate mine has been discovered in nearby Isoverde (north of Chiavari) by the Societa Acquedotto Defarrari Galliera, in the course of drilling for a water supply for the new water works on the Tigullio Gulf.

The South African Rand Mining Co. has already sent geologists and engineers to the spot on behalf of British mining interests. The Deferrari Galliera has purchased extensive sites around the drilling territory.

Employee Testing Service Can Save Money

Many employers are now using the job aptitude testing service available at local public employment offices as a means of cutting costs. Greatest savings are made by those with costly training programs or high turnover due to inability to get the right persons in the jobs.

The U. S. Employment Service has 225 specific aptitude test batteries developed in cooperation with local employment offices operated by the states. Tests developed for one employer are made available by USES to all employers in any part of the country. On request, the employment service will let employers give the test themselves at their plant, if they give it under certain controlled conditions. More than 300 employers use the tests on this basis while many others find tests useful in relocating the work force.

Here is how the system worked with the Dravo Corp. in Pittsburgh. It had a problem training draftsmen. Only 13 out of 30 trainees lasted the three to four years required to turn an inexperienced worker into a top-notch draftsman. About $2200 was needed to develop a draftsman.

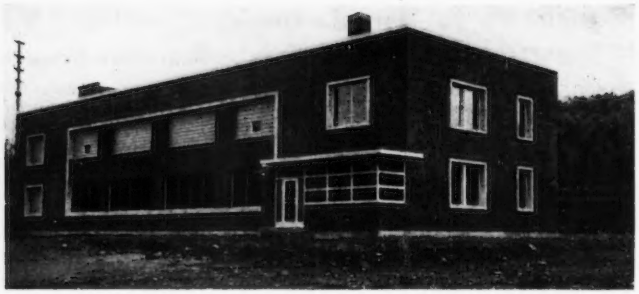
At the company's request the Pittsburgh office of the Pennsylvania State Employment Service developed a test, tailor made, for selecting job applicants with a potential ability for drafting. The test battery included several paper-and-pencil tests, a peg board measuring hand dexterity, and a rivet-and-washer board measuring finger dexterity.

Since then nine applicants who passed the draftsman aptitude test have been sent to Dravo. All have proved satisfactory. The company says they are of much higher quality than men they had been hiring, and the training period can be shortened.

Although tests cover 30 industries, none has been developed yet for metal mining. On request, the employment service will cooperate with an employer in setting up a test for a particular job.

Meeting Planned for United Western Miners

A program for an organization meeting of United Western Miners, tentatively set for November 6 to 9 at Reno, was drafted by a group of mining leaders in San Francisco early in August. The new association will organize the small mining operators in eleven western states. Heading the program committee were William R. New, secretary of the Idaho Small Mine Operators Assn., and J. C. Kempvanee, head of Oro Fino Consolidated Mines of Auburn and chairman of the California Gold Committee.



NEW RESEARCH LABORATORY of Cleveland Cliffs Iron Co. recently opened at Ishpeming.

"San Francisco Plan" Would Divide Metal Tariff Receipts Among Domestic Producers

Division of tariff receipts on imported metals among domestic producers in proportion to their production of each metal is the basis of the "San Francisco Plan," recently introduced into the Senate by Senator McCarran of Nevada as Senate Bill 2320. The plan originated with the Mining Committee of the San Francisco Chamber of Commerce.

According to Chamber estimates, production payments to U. S. mines for 1948 under the plan would have been $5,132,429, with a maximum for any year not exceeding $5,900,000. Payments derived from import duties, it was suggested, would not only protect America from complete shutdown of the four essential metals but would sparkplug an industry which should sell about $20 million yearly.

In schedules suggested by the bill, funds diverted into the pool for distribution to American mines would be on the basis of 5c per 20-lb. unit of manganese imported; 1c per lb. on antimony imported; $19 a flask on quicksilver, and $7.60 per 15.8-lb. tungsten unit imported. The plan would boost prices for domestic producers of manganese from $1 to $1.20 per unit; $34 per unit for tungsten, and $113 a flask for quicksilver. Increases in antimony would depend on whether the Geneva Trade Agreement tariff stands.

It was pointed out that there is ample precedent for the bill. Since 1935, Section 32 of the Agricultural Adjustment Act has provided funds for similar payments to farmers based on agricultural product imports.

Aluminum Co. Negotiates with B. C. Govt.

Top administrative and legal officials of the Aluminum Company of Canada entered discussions in mid-July with the British Columbia provincial government on terms of an agreement for development of a huge hydro program in connection with the company's proposed $350-500 million plant development in the coastal area of the province.

McNeely Dubose, vice president, Paul Lehman, Montreal lawyer, and Edward Baker, legal financial expert for the company from New York, met Maj. R. C. Farrow, water rights comptroller, and George Melrose, deputy minister of lands, at Victoria.

The company already has started a million-dollar survey of sites, with activity centralized on Tweedsmuir Park, west-central British Columbia, which company officials now report is their chosen area, providing present tests prove the engineering possibilities of the area.

Envisaged is a 1,500,000-hp. hydro development to be carried out by damming the Nechako River, Fraser River tributary and creating a lake district with a surface area of some 600 sq. mi. with east-south flow of water being changed to a westerly direction.

Actual decision on the site will not be made for at least a year, according to Vice President Dubose, who has just returned from the area.

Gold Coast Survey May Aid Bauxite Mines

Sir William Halcrow and Partners, London, have agreed to undertake a survey of the vast industrial and transport potentialities of the Volta River in the Gold Coast. The survey will be concerned with the development of hydroelectric power at Ajena and/or Bui, the irrigation and drainage of lands in or near the Volta catchment, and the provision of port facilities at either Ada or Accra.

Nearby bauxite mines can use all the power that can be generated.

Preliminary survey has been made by air, but the main part of the undertaking will get under way in October of this year.

MINING IN 1867

These items made news in E&MJ for September, 1867:

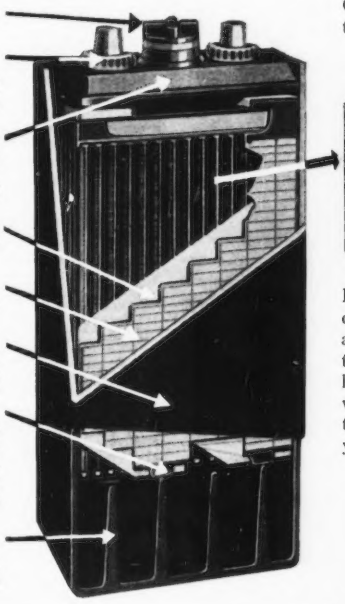
☛The findings of diamonds in California, reported at the last meeting of the Academy of Sciences of that State, is the fourth discovery of those gems made within the limits of the United States. Persons familiar with the characteristics of the diamond-producing regions of the East Indies and Brazil, who have visited California, have agreed in predicting that diamonds would be found in her soil. In Brazil, the goldwashers used to pick out and throw aside certain irregularly shaped flinty pebbles . . . until a Portugese traveler discovered that those rejected stones were diamonds. This may have been the case in California until Professor Silliman paid his visit and pronounced upon the true character of the minerals submitted to his inspection.

☛A Philadelphia paper says: The one and two cent coins now made at our Mint are of bronze, and do not contain nickel, as many persons suppose. The three and five cent coins are of an alloy composed of one-fourth nickel and three-fourths copper. . . . The nickel works at Camden, N. J., have supplied to the Mint nearly all the nickel hitherto used for those coins; though owing to the inequitably low import duty on nickel (15%), it was found necessary to stop refining at Camden, and to send to England the partially worked ore of Gap mine to be refined there, and brought back to the Mint as finished nickel. Having recommended a year ago to refine nickel at the Camden works . . . they have since then supplied the Mint with a choice quality of nickel, at the current rates, considerably lower than the average price heretofore paid by the Mint. About a month ago, however, the officers of the Philadelphia Mint . . . entered into contract with an English firm for a supply of nickel a few cents under the American market price, so that considerable of our coin will hereafter be really made out of English metal. The total value of the Gap mine and Smelting Works and Camden Nickel Works, is but about $300,000, though those establishments employ 200 hands and a capital of $300,000. That product is, however, capable of yielding German silver wares worth $10,000,000, or coins to the amount of $3,000,000. Nickel is . . . not an abundant metal, there being but three or four localities of it in the United States, and the only locality where it is profitably worked is in Lancaster County, Pa.

EXIDE-IRONCLAD BATTERIES
ARE DIFFERENT!

Specially designed to provide dependable power for
MINE LOCOMOTIVES, SHUTTLE CARS, TRAMMERS

Storage batteries are called upon to perform many tasks. No single type of battery is adequately suited to all. To meet these numerous requirements, Exide engineers have developed special types, to fit each application.* Among these several types is the specially designed Exide-Ironclad Battery. Details shown below.



VENT PLUG specially designed to prevent escape of electrolyte.

GREASE SEAL RING NUT holds battery elements securely in place . . . prevents creepage of electrolyte . . . keeps tops clean and dry.

SEALED CELL COVER flush with top of jar. Prevents collection of dirt or moisture . . . keeps impurities out of cell . . . eliminates leakage of electrolyte.

SEPARATOR of high porosity, specially treated to last the life of the battery.

NEGATIVE PLATE made extra heavy and built to match the long life of the positive plate.

JAR made of specially tough and durable Giant Compound. Built to withstand the jolts and jars of hard industrial usage.

FEET. Internal short circuits practically eliminated because the two feet on negative plate rest on different ribs from those of the positive plate, and because separators extend below both plates and rest on all four ribs.

RIBS support all plates and separators. Their height provides generous sediment space so that internal cleaning is unnecessary.

DIFFERENT IN DESIGN
DIFFERENT IN CONSTRUCTION
DIFFERENT IN SERVICE QUALITIES

Chief among these differences is the unique positive plate, an exclusive Exide feature.

EXIDE-IRONCLAD POSITIVE PLATE

Consists of a series of finely-slotted tubes which contain the active material. So small are these slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose . . . adding considerably to life of plate.

Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from mine locomotives, trammers and shuttle cars—high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these four Exide-Ironclad characteristics assures years of dependable day-in, day-out service.

*

DESIGNED FOR STATIONARY USE

The Exide-Manchex Battery has the manchester type positive plate with the lead button construction. Specially designed for stationary use in many classes of industry.

DESIGNED FOR AUTOMOBILE USE

The Exide Automobile Battery has plates of staggered grid construction. Specially designed for use in automobiles, trucks, buses, aircraft and numerous other applications.

SAFE DEPENDABLE POWER

"Exide" and "Exide-Ironclad" *Reg. Trade-marks U. S. Pat. Off.*

1888...DEPENDABLE BATTERIES FOR 61 YEARS...1949

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

URANIUM ORE processing plant of the United States Vanadium Corp., at Rifle, Colo., produces uranium oxide from carnotite-roscoelite ores mined in the area.

Uranium Mining in the Colorado Plateau Area

THE FOLLOWING summary of uranium mining and processing operations in the Colorado Plateau is based upon information supplied by Jesse C. Johnson, Assistant Manager, Raw Materials Operations Office, and Leo J. Coady, mining engineer, Colorado Raw Materials Office of the United States Atomic Energy Commission.

The two large companies operating mines and ore processing plants in the area are the United States Vanadium Corporation and the Vanadium Corporation of America. The U. S. Atomic Energy Commission also operates an ore-buying station at Monticello, Utah, where a uranium ore processing plant is under construction. This will be placed in operation early in September.

Vanadium Corporation of America operates its own uranium processing plant at Naturita, Colo. Current ore requirements for this plant are derived from 175 individual operations, some of which are company operated mines. Vanadium Corporation has also constructed an experimental ore processing plant at Hite, Utah, which started operations recently. Stockpiled ore at this plant is acquired from two different operations. The plant is designed to treat copper-uranium ores of the White Canyon country of southeastern Utah. The Durango plant of the Vanadium Corporation, which was leased from the Atomic Energy Commission, acquires ore from eight different operations.

United States Vanadium Corporation owns and operates an ore processing plant at Rifle, Colo., and is at present reconditioning its plant at Uravan, which is expected to begin treating uranium ore about Dec. 1. Uranium ore is now purchased and stockpiled at this plant. Most of the ore requirements for these two plants originate at company operations. It is estimated that 10 small operators supply additional ore.

The U. S. Atomic Energy Commission is modifying and rehabilitating the Monticello, Utah, uranium ore processing plant which will be operated by the Galigher Company of Salt Lake City under contract. The ore sampling plant at Monticello, which has been accepting ores since July, 1948, is operated by the American Smelting and Refining Co. under contract with the Commission. During the month of April, 1949, the Monticello sampling plant purchased ore for stockpile from 39 operators working 59 properties.

Based on field operations, it is estimated that the number of employees at each of these small operations is about four, including ore haulers. Some operators in the Monticello area have their own trucks, and others prefer contract hauling.

Ore deposits of the carnotite and roscoelite type of mineralization occur in the Salt Wash member of the Morrison formation. Prospectors discovered and staked their claims on outcrops at the rim of the canyons or on the surface. Consequently, most mining to date has occurred at the rims or not far removed. The U. S. Geological Survey, under contract with the Atomic Energy Commission, has diamond drilled many areas and located holes some distance away from the rim to determine extensions of ore horizons.

Ore occurs in the favorable beds in sporadic "rolls" or "pods." Continuity and extent are unpredictable. However, in some instances there seems to be a definite trend to the mineralization.

To date but few large orebodies have been found which permit systematic methods of mining. Most mining excavations of small operators in the past were performed by relatively crude methods with inadequate equipment. Breast or underhand stoping methods have been used, depending upon conditions. But few operators have installed cars and track and still use wheelbarrows to transport ore from points underground to loading platforms. Few ore bins have ever been built. As mining extends back from the rims, operators will find it necessary to install haulage and other equipment.

Operations Total 287

As of July 1, there were approximately 287 mining operations in the Colorado Plateau area, employing about 720 miners and 170 truckers. Of this number, 32 operations, 105 miners, and 46 truckers were employed by the two major operating companies. The remaining operations are run by independents who usually sell their ore to the plant nearest to their operation. It is expected that approximately 403 persons will be employed to operate all previously mentioned plants and ore buying stations in the area when completed, and an additional 127 persons for indirect services.

It is estimated that the following number of people, totaling 270, were employed in exploration work by private companies and Government agencies as of July 1: Government AEC and U.S.G.S., 83; contractors performing work for the AEC and U.S.G.S., 94; private companies, V.C.A. and U.S.V., 35; private individuals, 8; professional prospectors, 50.

PERSONAL NEWS

Louis S. Cates, chairman of the board, Phelps Dodge Corp., sailed July 21 for a week's visit in London, following which he left for Capetown. He was joined the latter part of August in Johannesburg by **Cleveland E. Dodge**, vice president, and **Harrison M. Lavender**, vice president and general manager of Phelps Dodge's western operations. The three officials visited mining properties at O'okiep, Namaqualand, Union of South Africa and Tsumeb in German Southwest Africa. Before returning to New York in early October the party plans to visit the Rhodesian copper belt and properties of the Union-Miniere du Haut Katanga in the Belgian Congo.

W. Legard has been appointed master mechanic of the Calera Mining Co., Forney, Idaho. **H. R. Fowlie** has been appointed mine engineer of Howe Sound Exploration Co., Ltd., Snow Lake, Manitoba.

Ralph E. Calhoun has been appointed southwestern representative for American Zinc, Lead & Smelting Co. He was formerly associated with the company's subsidiary, the American Zinc Co. of Illinois, having served in various capacities since 1924.

Joseph E. Parker, Butte, Mont., has been elected president of the North Butte Mining Co., succeeding the late **Paul A. Gow**. **George L. Gow** succeeded his father as a member of the board. **I. E. Serigstad** has been appointed general manager and **C. L. Van Alstine**, chief engineer of the company.

Murl H. Gidel has been elected president of the Alumni Association of the Montana School of Mines for the coming year. He is chief geologist for Anaconda Copper Mining Co.

Robert Diefendorf has been elected assistant comptroller, costs and statistics of the Oliver Iron Mining Co., Duluth, Minn.

Allan James, formerly associated with St. Joseph Lead Co., was recently appointed resident geologist at the Mt. Hope mine, Warren Foundry & Pipe Corp. **Norton Terry**, mining engineer, formerly with Republic Steel Corp., and **Douglas Castleburg**, a recent graduate of the Missouri School of Mines, were named to the engineering staff.

E. J. Carlyle, executive director and secretary-treasurer of the Canadian Institute of Mining & Metallurgy since 1947, will retire Sept. 30. After graduating from McGill University, he received early professional training at Anaconda, Mont., and Arizona. Prior to his appointment as secretary-treasurer of the Canadian Institute in 1931, he was superintendent of the American Smelting & Refining Co. in Peru.

Glenn H. Fritz, formerly assistant mining engineer, Anaconda Copper Mining Co., is now employed as a sales trainee with the Joy Manufacturing Company.

Fred B. Greusel, San Bernardino, was elected president of the San Bernardino-Riverside chapter of the Western Mining Council to serve until Jan. 1, 1950. Other officers elected were **John E. Klein**, Redlands, first vice president; **William L. Kern**, Riverside, second vice president; **Jack Markham**, San Bernardino, third vice president, and **Mrs. Louis Kitzmiller**, Highland, secretary-treasurer.

MACK C. LAKE, mining engineer and geologist, has been appointed consulting engineer for the Oliver Iron Mining Co. and other U. S. Steel Corp. subsidiaries. He will deal largely with the company's ore developments in foreign fields. In 1915 he joined the M. A. Hanna organization at Duluth as geologist in connection with its operations in the Lake Superior district. During the past several years he has been associated with the Hanna company's Labrador iron ore exploration. Since 1945, Mr. Lake has assisted the Oliver Iron Mining Co. as a consulting geologist in charge of its Venezuelan exploration program.

Herman T. Reifel, division superintendent in charge of construction, maintenance and operations for the Mesabi range division of the Minnesota Power & Light Company, Eveleth, Minn., has retired. Mr. Reifel was formerly superintendent of the La Rue mine.

T. W. Lippert has been appointed manager of publications and editor of the *Journal of Metals* by the American Institute of Mining & Metallurgical Engineers. For the past 16 years he has been associated with *Iron Age*, serving as directing editor, and as a director of the Chilton Co.

P. B. Lord, general manager, Mexican Mining Dept. of American Smelting & Refining Co., has recently spent several weeks at the home office in New York. **C. P. Pollock**, resident engineer, has returned from a two weeks' trip to Toburn Gold Mines., Ltd., Kirkland Lake, Ont. **V. I. Mann**, resident engineer, recently spent several weeks at Buchans Mining Co., Ltd., Buchans, Newfoundland.

Robert A. Willoughby, metallurgist with Union Sugar Co., in Betterovia, Calif., has joined the staff of Yucca Mining & Milling Co., Yucca, Ariz.

Robert E. Tally, formerly mining engineer, Foley Brothers, Inc., Pasadena, Calif., is now associated with Eastern Mining & Metals Co., Ltd., Kuala Dungun, Trengganu, Malaya.

William F. Jahn has recently returned to Missoula County, Stark, Mont., after spending eight years in Argentina where he did consulting work.

A. L. Johnson, formerly underground superintendent for Pickands, Mather & Co., in the Iron River district, Michigan, has been made assistant superintendent at the Cary mine, Hurley, Wis., on the Gogebic range. **Arthur Martini**, former captain at the Zimmerman mine, succeeds Mr. Johnson as acting underground superintendent.

Joseph Armstrong, mining engineer, has gone to Spokane, Wash., to join the Pacific Northwest Alloys, affiliate of Chromium Mining & Smelting Co. He has been at Sault Ste. Marie, Ont.

Frederick G. Michels, Ishpeming, Mich., formerly representative of Mines Safety Appliance Co., has joined the North Range Mining Co. as director of safety for their three underground properties.

Charles F. Willis, state secretary of the Arizona Small Mine Operators Association has been invited to attend the United Nations Conference at Lake Success, N. Y., on "Conservation and Efficient Utilization of World's Mineral Resources."

H. L. Hartmen, Jr., of Phoenix, has been named state mine dust engineer. He is a graduate of Pennsylvania State College and has specialized as a ventilation and dust control engineer.

Dr. Karl T. Compton, former president of the Massachusetts Institute of Technology, now chairman of the U. S. Research and Development Board, headed the annual conference of scientists, held at the Hanford works, Richland, Wash., in July. Other visitors during the four-day conferences were **William Brewster**, chairman of the research board's committee on

atomic energy; **Dr. G. T. Felback,** vice president of the Carbide Chemical Corp.; **Dr. Robert Rinehard,** executive secretary of the board; **H. A. Winne,** vice president of the General Electric, and **W. H. Hosford,** retired vice president of Western Electric.

Six representatives of the mining industry from three mining companies are enrolled as special students in mining engineering at the Michigan College of Mining & Technology. They are taking part in summer field trips in Michigan and western states. The group is composed of two men from Oliver Iron Mining Co.: **Donald A. Berkner,** of Ely, Minn., and **Robert D. Lindberg,** of Ironwood, Mich.; one from the Snyder Mining Co.: **T. J. Barker** and three engineers from New Jersey Zinc Co.: **M. W. Lanning, J. E. Nelson** and **R. H. Chornie.**

Carl R. Moss, associate professor of engineering administration at the Michigan College of Mining & Technology, has been appointed acting head of the department, effective July 1.

Lionel Sleeman, of Iron River, has accepted appointment to the Michigan Committee on Organization of Federal Government. Its work is aimed at study of the Hoover Commission findings and acquainting the people of the state with them. The committee will function as voluntary, independent group of citizens without formal organization or power. Its work will be educational rather than promotional.

Frank Woodruff, former captain of the James mine, at Mineral Hills, Mich., is now general superintendent of the Warren Foundry & Pipe Corp. mine at Mt. Hope, N. J.

James Douglas, secretary, Phelps Dodge Corp., has been named to the 19-member Citizens Committee to aid and assist in arrangements for the United Nations Scientific Conference on Conservation and Utilization of Resources. The conference met August 17 at Lake Success.

A. Ben Shallet has been appointed superintendent of operations at the Bald Butte and Carbonate mines, Marysville, Lewis & Clark County, according to an announcement by **Morris Lawlor,** vice president and general manager of Carbonate Mines.

H. J. Steinbuchel, Jr., and **F. J. Hitchcock,** mining engineers; and **John A. Riddle** and **William L. Seiher,** metallurgical engineers, have joined the Oliver Iron Mining Co.'s training division, as trainees.

H. Gordon Poole, professor of mining engineering, University of Washington, has returned, following a year's leave of absence, from Mexico City, where he was attached to the American Embassy as a mining metallurgical consultant of the U. S. Bureau of Mines to the Mexican Government.

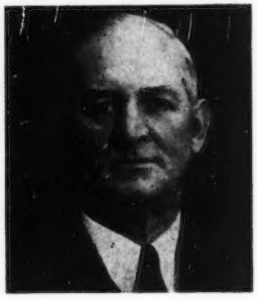
P. H. Reagan, consulting mining engineer, Hye, Tex., has returned from Central America and is now in Western Australia. He expects to return to his office in December.

Pat E. Green, general mine foreman, Patino Mines & Enterprises, has returned to Cashmere, Wash., after spending some time at New York Hospital. On May 28, he was injured in a riot in Bolivia.

John C. Roehm, associate engineer of the staff of the Alaskan Territorial Department of Mines for 10 years until 1947, has been reappointed to that position, following his return from Arkansas. He succeeded **Bruce I. Thomas,** who resigned last fall to accept the management of the Brinker-Johnson dredging operation on Caribou Creek in the Salcha district. Mr. Roehm will be stationed at Fairbanks.

Evan Just, director of the strategic materials division, economic Cooperation Administration, has returned to Washington, after spending two months in Europe, where he visited the various ECA countries.

OBITUARIES



HARRY DAVENPORT, general superintendent of the Mt. Hope mines, Warren Foundry & Pipe Corp., died June 4. He was 60. He became associated with the Mt. Hope mine of the Replogle Steel Co., as assistant mill superintendent in 1913 and retained that position when Warren Foundry & Pipe Corp., took control of the Mt. Hope interests in 1924. Following a shutdown from 1932 to 1937, he was promoted to mill superintendent of the concentrate mill and was later made superintendent of both the concentrate and lump ore mills. In 1940 Mr. Davenport was made general superintendent. He was the inventor of the "Davenport Wet Separators" now used in the Mt. Hope concentrate mill.

Carl Erickson, mining engineer long active in mining exploration in Canada, died at his home in Toronto, June 28. A native of Michigan, and a graduate of the Michigan College of Mines, he was assayer at Norando in the early stages of that company and afterwards manager of the Amulet mine before its amalgamation with the Norando and the Waite. At the time of his death he was head of an exploration firm bearing his own name, "The Carl Erickson Associates." He was 56.

Alexander M. Boyle, 62, mining engineer, died in San Francisco on July 23.

Geoffrey Musgrave, chairman of the Rhodesian Iron and Steel Corp. and consulting engineer to the Rhodesian Chrome Mines, Ltd., died at Selukwe during July. He was the first chairman of the commission and was responsible for setting up the steel works at Que Que.

Walter C. Schaus, mine operator of Gilpin County, Co., died recently in Denver following a heart attack. He went to Central City three years ago to operate the smelter and rock-wool plant on the eastern slope of Quartz Hill.

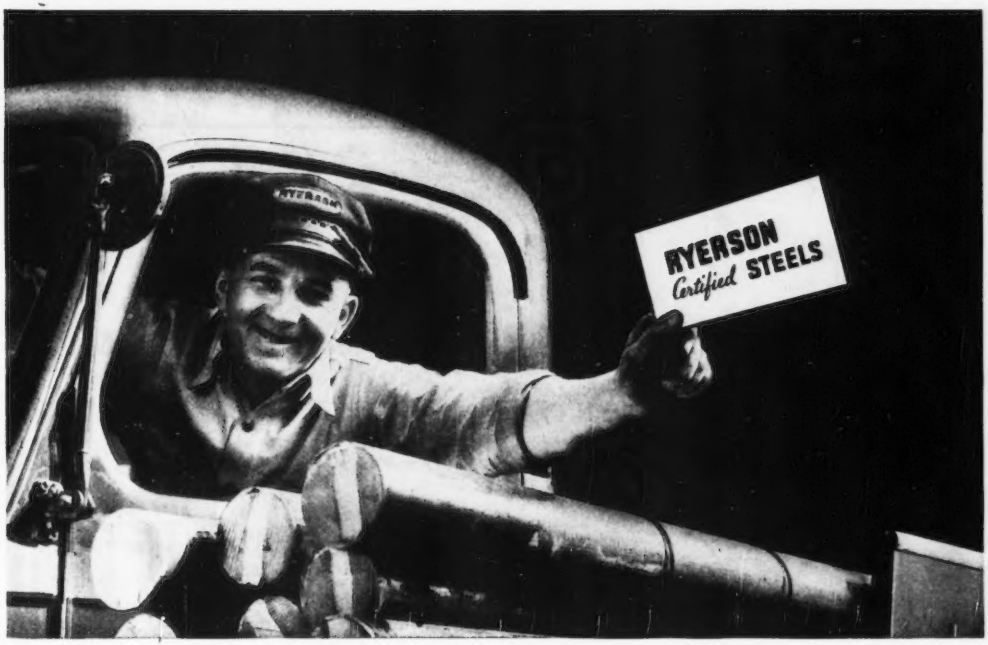
Thomas Kavanaugh, for more than 50 years an important figure in mining and milling in the Cripple Creek district, died recently. In 1911 he built and managed the Kavanaugh mill at Cripple Creek which treated gold ore from the Joe Dandy mine. This was his principal interest until 1915 when he became owner and manager of the Ironclad mine and mill.

Harvey M. Ross, 88, former mine operator in Idaho and Montana, died July 14, at Seattle, where he had lived for 31 years. He was president of the Sydney Mining Co. in Idaho for many years, operating zinc, lead and silver mines.

William Bowen Gohring, engineer and inspector for the mine loan division of the RFC in Arizona, died July 12 at Phoenix.

Fritz J. Hansgirg, chemical engineer who invented the internationally known Hansgirg method of manufacturing metallic magnesium, died July 23. He was 58. A native of Austria, he went to Japan in 1934 where he spent six years. He erected the magnesium plant for the Nippon Magnesium Metals Co., Ltd., formed by the American Magnesium Metals Corp., of which he was vice president. He was chief engineer of Permanente Metals Corp.

Frank Collins, mechanical engineer for Pan-American Engineering Co., Berkeley, Calif., died in San Francisco, July 28. He had been in ill health for some time. Mr. Collins had an unusually wide acquaintance among mining men. His fund of anecdotes and his technical competence were spoken of in mining camps all over the world. His mining experience included design work with nearly all the major copper companies here and abroad and at the time of his death he was regarded as the leading authority on the use of jigs and on gold dredges.



Daily Steel Deliveries to the Mining Industry

Wherever you are, Ryerson trucks are rolling your way every day . . . speeding shipments of the finest quality steel from nearby Ryerson stocks.

Carbon, alloy and stainless analyses in thousands of shapes, sizes and finishes make up this daily stream of steel. In pounds and tons it flows to your industry from the nationwide network of thirteen big Ryerson plants.

This service cuts purchasing time because one call to Ryerson, one order and one invoice quickly covers a whole group of steel requirements. Do you want one piece or a truckload? You get prompt, personal service either way. Do you want your steel sheared, sawed or slit—burned, bent, punched or threaded? You can be sure of getting quick accurate delivery from your nearby Ryerson plant. So call us next time you need steel from stock. We'll get it to you faster because we're coming your way every day.

PRINCIPAL PRODUCTS

BARS—Carbon & alloy, hot rolled & cold finished

STAINLESS—Allegheny metal plates, sheets, bars, etc.

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Sheared & U. M., Inland 4-Way Floor Plate

TUBING—Seamless & welded mechanical & boiler tubes

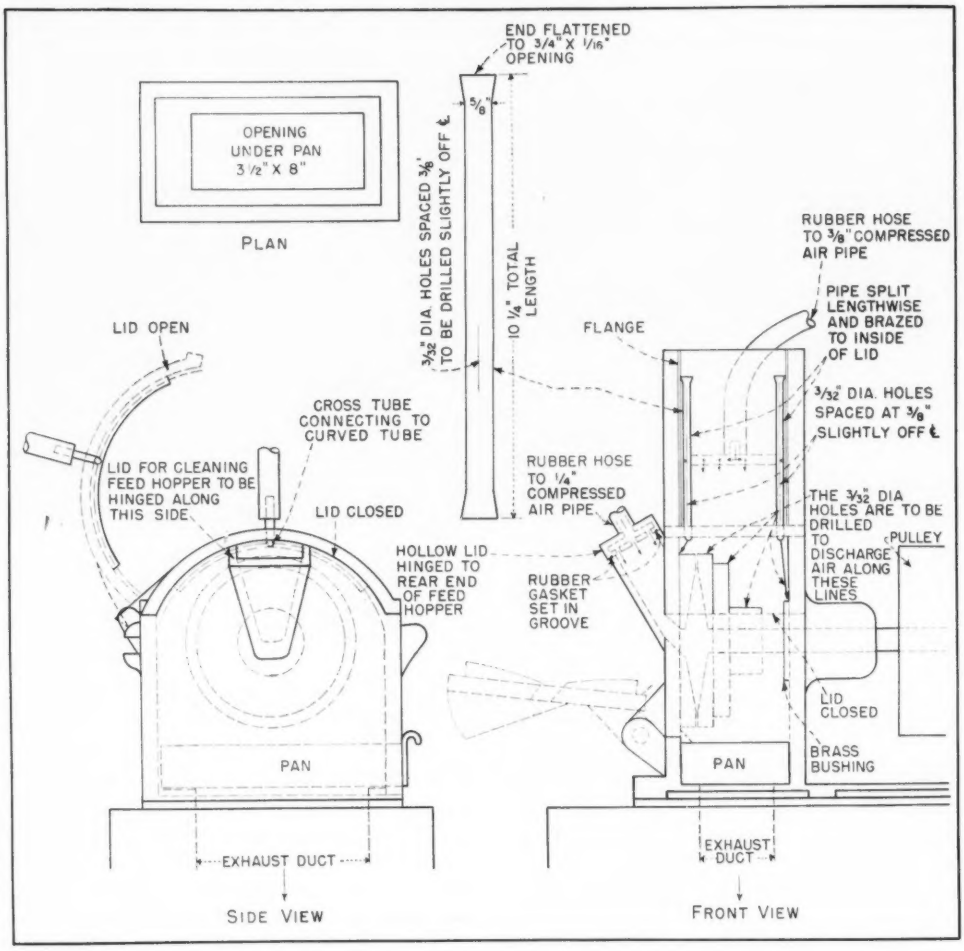
SHEETS—Hot & cold rolled, many types & coatings

MACHINERY & TOOLS—For metal working

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

OPERATING IDEAS

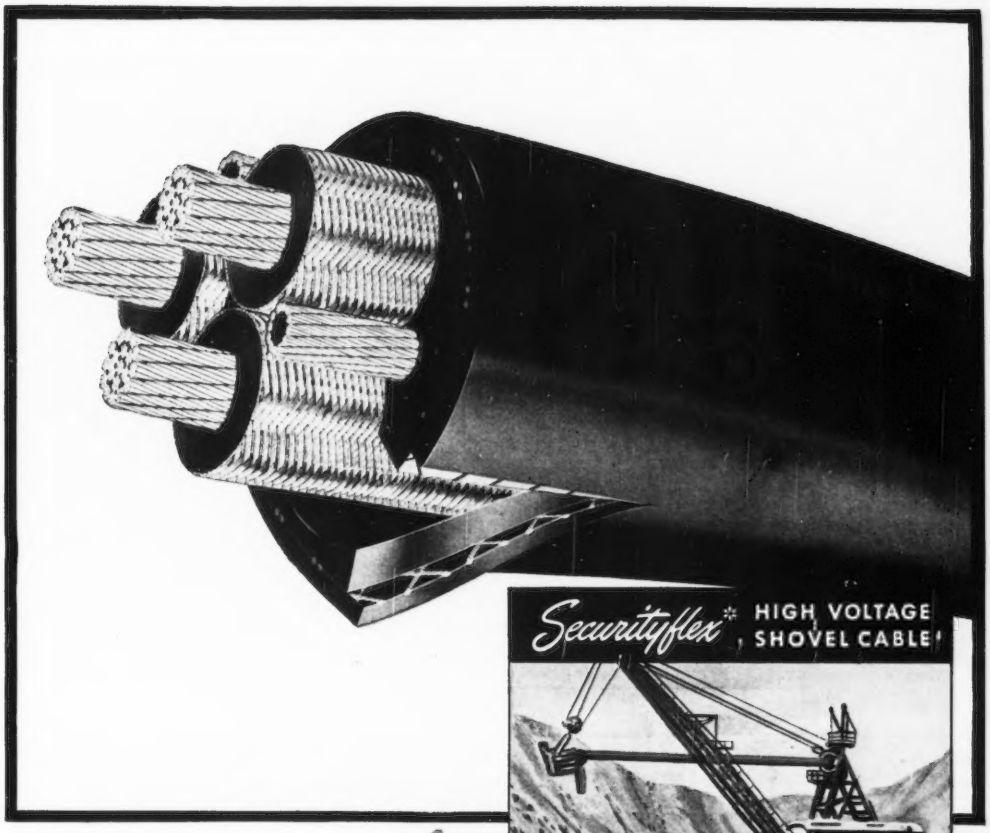

END FLATTENED TO 3/4" X 1/16" OPENING
OPENING UNDER PAN 3 1/2" X 8"
PLAN
5/8"
3/32" DIA HOLES SPACED 3/8" TO BE DRILLED SLIGHTLY OFF ℄
10 1/4" TOTAL LENGTH
RUBBER HOSE TO 3/8" COMPRESSED AIR PIPE
PIPE SPLIT LENGTHWISE AND BRAZED TO INSIDE OF LID
FLANGE
3/32" DIA. HOLES SPACED AT 3/8" SLIGHTLY OFF ℄
LID OPEN
CROSS TUBE CONNECTING TO CURVED TUBE
LID FOR CLEANING FEED HOPPER TO BE HINGED ALONG THIS SIDE
LID CLOSED
RUBBER HOSE TO 1/4" COMPRESSED AIR PIPE
THE 3/32" DIA HOLES ARE TO BE DRILLED TO DISCHARGE AIR ALONG THESE LINES
PULLEY
HOLLOW LID HINGED TO REAR END OF FEED HOPPER
RUBBER GASKET SET IN GROOVE
LID CLOSED
BRASS BUSHING
PAN
PAN
EXHAUST DUCT
EXHAUST DUCT
SIDE VIEW
FRONT VIEW

Internal Air Jets Clean Pulverizer Safely

In 1941, G. Reuben Yourt of the Kirkland Lake Branch, C.I.M.M., was awarded first prize for his paper on "Assay Office Dust Control at the Wright-Hargreaves Mines, Ltd.," which contained illustrations and a description of a pulverizer dust cleaner. Several modifications of the earlier design have been made. The above drawing shows a revised design presented through the courtesy of Mr. Yourt and C. S. Gibson of the Ontario Mines Accident Prevention Association. This organization is also active in the promotion of good ventilation and effective dust control practice.

As shown above, compressed air is introduced into the closed pulverizer housing through two hoses which connect to numerous jets properly placed to clean dust from all moving parts and crevices. The dust is drawn out through an exhaust duct which connects to the main exhaust of the assay office.

Two split pieces of 5/8-in.-dia. tubing curved to fit the inside of the pulverizer lid are connected to the compressed air inlet and brazed to the lid to provide ample distribution of jets for cleaning the pulverizer parts. The side jet system entering through the feed hopper cleans the pulverizer plates thoroughly without exposing operators to dust hazards sometimes present in pulverizer operations.



Engineered TO REDUCE DOWN-TIME

DON'T let costly electrified equipment be hampered by cable failures; invest in Securityflex High Voltage (Type SHD) Shovel Cable.

Patented grounding wires with neoprene cores are cushioned against shock, contact conductor shields at six points . . . revolutionary AB* insulation gives new resistance to corona discharge, moisture, is approved for 75° C... inner-belt-and-filler-combined conducts heat away for cooler operation under extreme overloads . . . new type conductor shields lie flatter, are easier to splice, can't chafe . . . extra rugged neoprene jacket resists flame and abrasion . . . cable won't kink. Here is a cable *engineered to reduce down-time.*

Write for Anaconda booklet DM 4822, which gives complete information on shovel cable. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

65478

ANACONDA *Securityflex** **MINE CABLE**

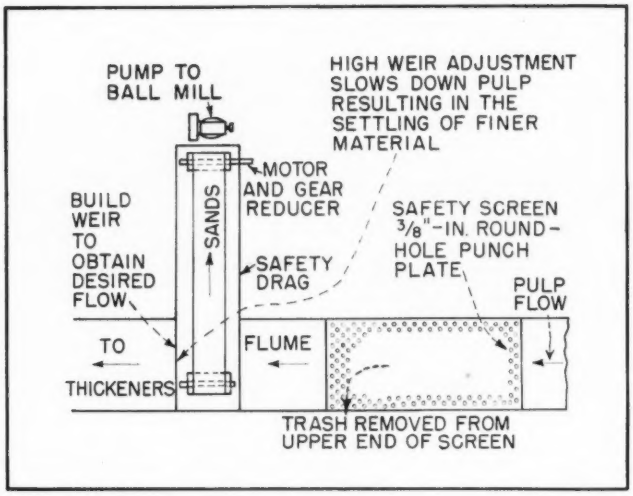
ANACONDA
from mine to consumer

*An Anaconda Trade-Mark

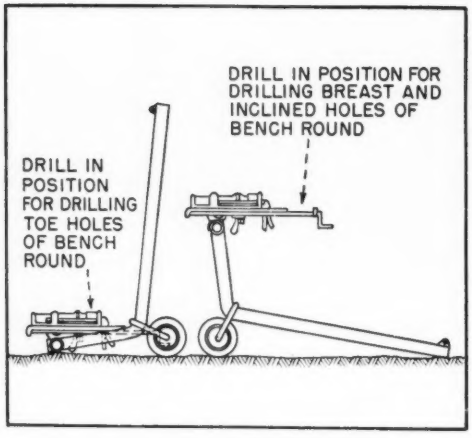
Safety Device Protects Thickeners

This unique arrangement to remove tramp oversize and general trash from the thickener feed has been designed by George A. Komadina, metallurgist of the Central Mill, Eagle-Picher Mining & Smelting Co., Cardin, Okla. A screen 20 ft. long was made from $\frac{3}{8}$-in. round-hole punch-plate, and laid in the approach flume at an angle of approximately 10 deg. Pulp passes through the screen and rolls pieces of wood, waste, and tramp oversize that may be picked up by the clean-up elevator, up the screen where the refuse is shoveled off periodically into trash cans.

Following the screen is a drag classifier designed to run at a belt speed of 5 fpm. to minimize any agitation. This drag operates at right angles to the flume carrying the pulp to the thickeners. Speed of the pulp flowing over the drag classifiers was controlled by a weir placed on the discharge side of the drag. All sand of sizes larger than plus 35-mesh is removed together with a considerable amount of minus 35-mesh, plus 65-mesh material. The sand removed from the pulp is pumped back to the ball mill for grinding.


PUMP TO BALL MILL
HIGH WEIR ADJUSTMENT SLOWS DOWN PULP RESULTING IN THE SETTLING OF FINER MATERIAL
MOTOR AND GEAR REDUCER
SANDS
BUILD WEIR TO OBTAIN DESIRED FLOW
SAFETY DRAG
SAFETY SCREEN 3/8"-IN. ROUND-HOLE PUNCH PLATE
PULP FLOW
TO THICKENERS
FLUME
TRASH REMOVED FROM UPPER END OF SCREEN

These two devices have helped considerably to prevent the diaphragm pumps from choking with settled trash or tramp oversize.


DRILL IN POSITION FOR DRILLING BREAST AND INCLINED HOLES OF BENCH ROUND
DRILL IN POSITION FOR DRILLING TOE HOLES OF BENCH ROUND

Lightweight Portable Drill Wagon

Two elbow-shaped pipes, two wheels, and a crossbar form the main elements of the above lightweight rubber-tired drill carriage designed and built at the Pend Oreille Mines & Metals Co. operations near Metaline Falls, Wash. The unit is particularly useful for drilling benches developed in the contour mining system used in underground operations of the Pend Oreille company. See E&MJ, July, 1949, pp. 104-105. As shown at the left, the carriage can be tilted upward to permit drilling of toe holes. It can also be used to drill horizontal holes and inclined holes when the legs of the frame rest on the ground, as shown at the right. A single drifter is mounted on the crossbar. The above illustrations are presented through the courtesy of C. A. R. Lambly, general superintendent.

THE COLORFUL STORY OF T5X

...THE FAMOUS PURPLE* OIL!

1. Back in the 1930's a new and improved Diesel engine went on the market. It was an excellent engine, but on regular oils its valves stuck and it loaded up with sludge. Because of this problem, Union Oil scientists went to work and developed an oil with a cleansing agent. They called it D5X. This new oil kept the new Diesel remarkably clean!

2. D5X was the forerunner of our present-day compounded oils and it did much to make possible the development of the dependable, economical, modern Diesel engine. By 1940 more new compounds had been added to the oil and its name was changed to T5X. With the new compounds and a 100% pure, paraffin base, T5X was found to be ideal not only for Diesels but for gasoline and gas powered engines as well!

3. When the war came, the Army set up Specification 2-104-b for heavy-duty lubricating oils—the most demanding set of requirements yet devised for a lubricant. T5X easily exceeded this specification. Throughout the war, T5X did a truly outstanding job in trucks, jeeps, landing craft—in practically all types of military equipment powered by internal combustion engines.

4. Since the war T5X has proved itself under the most severe tests and operating conditions. Its exclusive detergent compound retards sludge to a remarkable degree. A special inhibitor retards oxidation and gives high heat stability. A neutralizing agent combats acidity. Still other additives guard against rust and corrosion. Now thoroughly tried and proved, T5X is available to you as the finest heavy-duty motor oil money can buy!

For full information on T5X phone your local Union Oil Representative or write Sales Dept., Union Oil Company, Los Angeles 14, California.

*T5X gets its distinctive color from an exclusive ingredient that helps give the oil its remarkable stability.

76 UNION **UNION OIL COMPANY** OF CALIFORNIA

NEW BOOKS

TIN—Its Mining, Production, Technology and Applications. New Second Edition. By C. L. Mantell, Ph.D., Consulting Engineer, New York. Rheinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Pp. 573. Price, $10.

Dr. Mantell's text on "Tin" is another one of the excellent monographs of the American Chemical Society which "tells all" about a specific commodity. Chapters included are: Physical and Chemical Properties (36 pp. with 177 references): Production, Distribution and Consumption; Ore and Ore Deposits; Mining and Ore Dressing; Metallurgy; and numerous others on qualities and uses of tin, its alloys and compounds.

PROSPECTING FOR URANIUM—Published by U. S. Atomic Energy Commission and U. S. Geological Survey. For sale by Superintendent of Documents, U. S. Govt. Printing Office, Washington 25, D. C. Pp. 123. Price, 30c.

This authoritative bantam-size cloth bound book tells where to look for uranium, how to test for it, how to use a Geiger counter, where to send samples of ore for assay, and how to sell uranium-bearing minerals to the Atomic Energy Commission. Laws and regulations governing uranium mining are simply stated. The text is designed to answer the flood of questions arising from persons seeking to find, mine and sell uranium-bearing minerals.

MINE PLANT DESIGN. New second edition by W W. Staley, Professor of Mining, University of Idaho, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Pp. 540. Price, $7.

Prof. Staley's well-known text has been revised extensively to include material suggested by engineers and teachers of mining engineering. The following new chapters totaling some 114 pages have been added: Review of Simple Design Principles; Ore Bins; Skips and Cages; and Safety Devices. Chapters on Roof Trusses; Columns and Footings; on Headframes; and on Mine Ventilation have been completely rewritten with almost entirely new material.

Chapters are generously illustrated with photographs and construction drawings; and supplemented with graphs, tables, and practical problems. In presenting this subject, the author has selected a nice balance of practical and theoretical topics to increase the usefulness of the text to students and mining engineers in the field.

THE DOMESTIC MINING INDUSTRY OF THE UNITED STATES IN WORLD WAR II. A critical analysis of the economic mobilization of the mineral base of national power. By John Davis Morgan, Jr., Major, Corps of Engineers, U. S. Army. Published by National Security Resources Board, with permission of the Pennsylvania State College School of Mineral Industries. Pp. 500. For sale by Superintendent of Documents, U. S. Govt. Printing Office, Washington 25, D. C. Price, $2.

The author's mission has been to analyze the performance of the mining industry during World War II and to present observations "backed with sufficient proof which will be of value to those Government agencies charged with planning of future economic mobilization, and to engineers of the mineral industry."

The wealth of charts, maps, tables, and historical data pertaining to the subject which the author has compiled fulfill his objective of supplying "sufficient proof." In some respects, the material presented needs no analysis. It speaks for itself. For instance the pages and pages of Government agencies which dealt with the mineral industry indicate that a similar number of agencies could not possibly perform efficiently in a fast shooting war of the future. As a partial remedy the author recommends a certain amount of streamlining by establishing a Federal Mineral Director who would control the entire mineral industry through a "chain of command" set up well in advance of hostilities. The Federal Director would be assisted by directors in each state.

The effects of L-208 are also thoroughly analyzed with the rather disconcerting conclusion that closing gold mines "had perhaps a greater psychologic value than actual value as far as the war effort was concerned." A reader of the L-208 story will perhaps wonder why the gold mining industry was singled out to establish "a precedent for the elimination of non-essential industries" when so many actual non-essential industries involving much larger labor forces were permitted to exist.

To combat enemy intelligence the author concludes, "In the field of mining engineering, I would suggest that no information be released except to those entitled to know it as necessary to their job, and that suitable identification be demanded before any person is invited to leaf through files of a company, trade organization or Federal or state agency." This theory may be sound, but administration of it would raise many serious questions. In fact, delays necessary to pass upon a person's eligibility for information might seriously impede domestic technical progress. Furthermore the wholesale throttling of the free exchange of technical information, unless absolutely necessary as in the case of the atomic bomb, would shift the economy into low gear and mesh progress to the limited pace of master planners in Washington.

Additional recommendations made by the author after reviewing the facts, pertain to coordination of the mineral industries in the Western Hemisphere; Government stockpiling; the mining industry and transportation; the administrative classification of modern mechanized mines; the manpower problem; mining machinery; underground facilities for a future war; and mineral industries intelligence for a future war. This broadside coverage of wartime mineral policy and supporting evidence should stimulate a good volume of constructive thinking.

BOOKS RECEIVED

Canadian Mines Handbook, 1949. Published by Northern Miner Press, Ltd., 122 Richmond St. West, Toronto 1, Canada. Pp. 360. Price, $2.

Mining Yearbook, 1949. A concise guide to mining companies all over the world compiled by Walter E. Skinner, 20 Copthall Ave., London, E. C. 2. Pp. 535. Price, $7, postfree abroad.

A Nomograph for Converting Weight Percent to Atomic Percent. By D. S. Eppelsheimer and J. E. Reynolds, of the Faculty of the Missouri School of Mines and Metallurgy. Published by the Missouri School of Mines and Metallurgy, Rolla, Mo.

Route Surveys. A pocket-size handbook covering theoretical and practical aspects of various types of route surveying by Russell R. Skelton, Prof. Civil Engineering, University of New Hampshire. Published by McGraw-Hill Book Co., Inc., New York 18, N. Y. 531 pp. including 295 pp. of useful trigometric tables. Price, $4.50.

Report of Research and Technologic Work on Explosives, Explosion, and Flames. R. I. 4502. By Bernard Lewis, Chief Explosives Branch, Bureau of Mines, Pittsburgh, Pa. Write to Superintendent of Documents, U. S. Govt. Printing Office, Washington, D. C.

Correlation of Gravity Observations with Geology of the Coal Creek Serpentine Mass, Blanco and Gillespie Counties, Texas. By Frederick Romberg and Virgil E. Barnes. Published by Bureau of Economic Geology, University of Texas, Austin 12, Texas.

Manganese Deposits of the Serra do Navio District, Territory of Amapa, Brazil. U. S. Geological Survey Bulletin 964-A. By John Van N. Dorr II, Charles F. Park, Jr. and Glycon de Paiva. Pp. 51. Write Superintendent of Documents, U. S. Govt. Printing Office, Washington 25, D. C. Price, 45c.

Principles of Metallographic Laboratory Practice. By George L. Kehl, Associate Professor of Metallurgy, Columbia University. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y. Pp. 520. Price, $5.50.

Inventory of Washington Minerals, Part I, Non-metallic Minerals. By Grant M. Valentine. Published by Division of Mines and Geology. For sale by Department of Conservation and Development, Olympia, Wash. Pp. 113. Contains 38 12x18-in. mineral maps. Price, $1.

REPRINTS AVAILABLE

The following reprints of articles published in past issues of E&MJ are available. Costs indicated cover preparation and handling charges.

Title	Pages	Price Per Copy
A Survey of Mining Progress (1947), (Part II, Haulage, Transport, Hoisting)	4	15c.
Part III (Ventilation, Communications, Drainage	4	15c.
Part IV (Open-Pit Mining)	4	15c.
Survey of Mining Practice (1949)	20	30c.
Presenting the Shuttle Car. A series of three articles on shuttle cars in non-metallic mines	16	20c.
The Premium Price Plan—Its Cost and Its Results, by H. E. Olund and S. A. Gustavson	8	20c.
Uranium Ore—How to Go About Finding and Mining It	4	15c.
Careers in Geology	4	3c.
Hoover Commission Recommends Modernizing Mining Laws	4	15c.
Titanium, the Metal With a Future	5	20c.
How to Operate a Flotation Machine	4	15c.
How to Operate a Thickener	4	15c.
How to Operate a Grinding Circuit	4	15c.
How to Operate a Drifter	4	15c.
How to Operate a Stoper	7	15c.
Foreign Ore Reserves of Copper, Lead and Zinc. (Jan. 1947) by William P. Shea	8	15c.
Interior Department Revises Mineral Reserve Estimates, (Jan. 1947)	4	15c.
Mining Research Evolves Clover-Leaf Burn Cut, by C. W. Livingston	8	15c.
Geiger-Mueller Counters Applied to Mining	4	15c.
Gravity Meter Survey Leads to Ore Discovery, by Frederick Romberg	4	15c.

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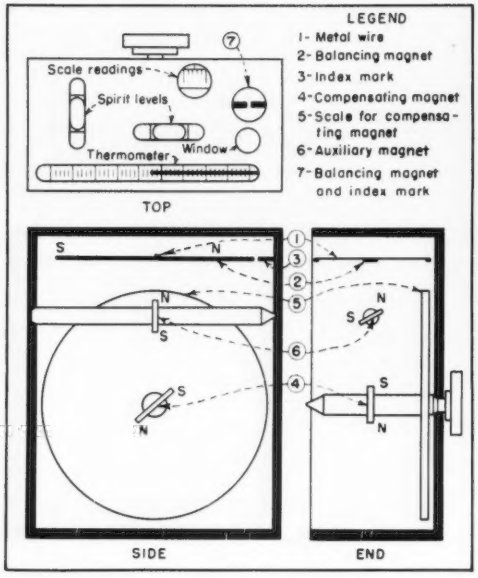
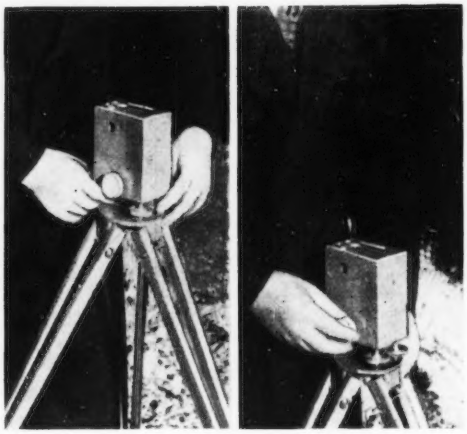
EQUIPMENT NEWS





AFTER LEVELING ARVELA MAGNETOMETER on a new station, the balancing magnet (1), deflected by the difference in the earth's field at the new location, is brought back to zero by rotating the compensating magnet (3). Amount of rotation, indicated on dial (5), gives relative change in magnetic field. Scale divisions are easily calibrated and range may vary.

Easy-to-Operate Magnetometer Cuts Survey Time

Extremely rapid magnetic surveys can be run with the new portable Arvela magnetometer, product of L. A. Levanto Oy, Helsinki, Finland. Under favorable conditions with stations 30 ft. apart, as many as 60 observations per hour can be made. Two features contributing to the speed and ease of operation are a new design which makes it unnecessary to orient the instrument with respect to a magnetic meridian, and elimination of the need to arrest the working parts when moving.

In principle, a delicately suspended balancing magnet is moved from its zero position by any change in the vertical component of the earth's field from one observation point to another. (The vertical component is used since it is stronger than the horizontal component in Finland as in all Northern latitudes.) The amount of adjusting of a compensating magnet to bring the balancing magnet back to the zero position is then read directly from the attached dial. Readings can be converted to gammas by calibrating the instrument with a Helmholz coil or an Alnico permanent magnet.

The balancing magnet is a lightweight magnetic needle fixed to a very thin horizontal wire. Torsional effect of the wire is counteracted by careful placement of the center of gravity. Thus the needle rotates easily with a slight change in the strength of the magnetic field. The wire is kept in constant tension by a special spring mounting. An index mark, clearly seen through a magnifying lens in the top of the case, indicates the zero position.

The compensating magnet directly beneath is rotated manually on a horizontal axis in the same vertical plane as the balancing magnet. Having an opposing field, it is used to return the balancing magnet to the zero mark. Its position can be read on a graduated circular scale fixed to one end of its axis.

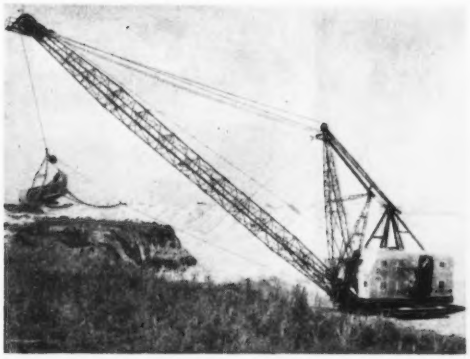
An auxiliary magnet may adjust the zero point of the balance without using the supplementary field set up by the compensating magnet.

Since the balancing magnet is horizontal when measurements are made, results are independent of the azimuth of the instrument. There is thus no need to orient the instrument with respect to a meridian. The balancing magnet is most insensitive when parallel to the meridian, but sensitivity remains great enough for most purposes.

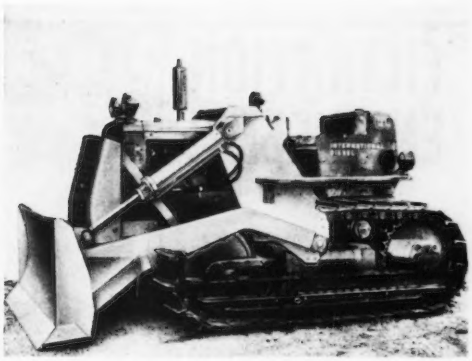
The effect produced by the compensating magnet is not a linear function of the arc through which it is rotated, but the scale is designed so that each division has the same magnetic value, 1/400 of the entire measuring range. Satisfactory speed and accuracy are attained by selecting a scale value between 10 and 40 gamma. Corresponding measuring ranges are 4,000 to 16,000 gamma.

Chief aim of the Arvela magnetometer is to speed up magnetic surveying. This has been done with some sacrifice in accuracy, but in Finland, where the diurnal change in the earth's field amounts to as much as 50 gamma and only anomalies greater than 100 to 200 gamma lend themselves to interpretation, the Arvela magnetometer has been sufficiently accurate for prospecting. This would hold true for similar areas in the western hemisphere, such as Canada. Field tests show that the average error for one observation is from 6 to 10 gamma. In extremely careful observations, however, an accuracy of 2 to 3 gamma may be achieved.

In running test traverses, 4,350 stations were occupied. With three operators working separately in different terrain under a variety of weather conditions, the average number of observations per hour for stations spaced 60 and 120 ft. apart, were 34 and 22, respectively. With stations at 30-ft. intervals as many as 60 observations an hour were made.



RIGID SAFETY CONNECTION between fixed and movable masts on Model 625 Page dragline, holds boom securely at various angles without depending on use of cables. Device is used by Page Engineering Co., Clearing P.O., Chicago 38, Ill.



HYDRAULIC STRAIGHT DOZER is completely tractor-main-frame mounted. Provides standard gage blade for wide gage tractor for full use of power without overload. Products of Wm. Bros. Boiler & Mfg. Co., Minneapolis, Minn.

BULLETINS

Explosives. A 40-page handbook, "Explosives Recommended under Average Conditions," has been released by Illinois Powder Mfg. Co. Write Dept. JM, 730 Pierce Bldg., St. Louis 2, Mo., for this informative handbook.

Cables. A complete catalog of Simplex-Tirex portable cords and cables is available from Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass.

Rock Bits. "New Rock Bits for Old Through Proper Reconditioning" is the title of a new bulletin put out by Timken Roller Bearing Co., Canton 6, Ohio.

Variable Speed Drive. A new 12-page bulletin describing an a.c. motor having infinitely adjustable speed is now available. Write the Louis Allis Co., 427 E. Stewart St., Milwaukee 7, Wis., for bulletin 611-B.

Silicone Greases. Two issues of Silicone Notes, D-5 and D-6, deal with the uses of silicone greases in ball bearings and electrical motors. Can be obtained from Dow Corning Corp., Midland, Mich.

Gas Pumps. Bulletin 32-33-B-13 covering operating characteristics, construction and performance curves of rotary positive gas pumps can now be had from Roots-Connersville Blower Corp., 900 West Mount St., Connersville, Ind.

Gas Welding. Available at any Air Reduction Sales Co. office is a new catalog on gas welding supplies.

Signalling Equipment. A new bulletin on electronic mine signaling equipment is available from Northern Electric Co., Ltd., distributors in Canada.

Magnetic Equipment. A new 12-page, two-color catalog describing the complete line of Eriez permanent nonelectric magnetic separators and electronic metal detectors is now available. Write for Catalog No. 14, Eriez Manufacturing Co., 892 East 12th St., Erie, Pa.

Furnaces. Burrell Technical Supply Co., 1942 Fifth Ave., Pittsburgh 19, Pa., announces new Burrell Box and Muffle furnaces for low and high temperature operation. Bulletins 315 and 515 available upon request.

Refractories. A particularly excellent book on refractories, their uses and manufacture, has been published by the General Refractories Co. Copies priced at $5.00 each are available by writing the company, Real Estate Trust Bldg., Philadelphia 2, Pa.

Fire Hoses. A new 6-page catalog section on its lines of industrial fire hose has been published by the B. F. Goodrich Co., Akron, O. Copies are available upon request.

Tractors. Caterpillar Tractor Co., Peoria 8, Ill., has published a 16-page booklet on adaptability of motor graders to various methods of road maintenance. Copies may be secured through local Caterpillar dealer or the company.

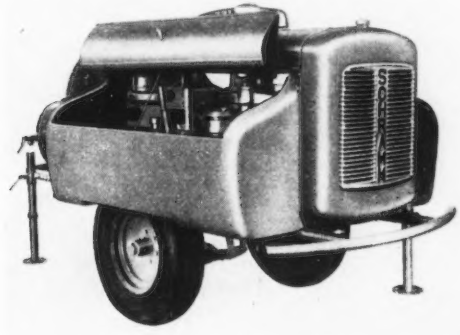
Electric Motors. Write Mr. L. C. Wiss, Lima Electric Co., Lima, Ohio, for their new Bulletin DB-1 on gearshift drives, electric motors, grinders and buffing and polishing lathes.

Shovels. Complete data on Conway shovels can be secured by writing Goodman Manufacturing Co., Halsted St. at 48th, Chicago 9, Ill.

Motors. Newly available line of protected type large a. c. motors described in Pub. No. 26 of Electric Machinery Mfg. Co., Minneapolis 13, Minn. Sent on request.

Lift Trucks. Bulletin 4861 of Barret-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill., describes new improved Barret "Ox" lift trucks. May be secured on request.

Air Valves. Complete line of Gerotor 4-way air valves are described in new 20-page catalog, Section 301. Write to Gerotor May Corp., Baltimore 3, Md.



INTERCHANGEABLE PARTS is a feature of modern compressor unit, with 90% of the engine parts interchangeable with the compressor. Delivers 105 cfm. Design eliminates two staging and intercoolers. Made by Schramm Inc., West Chester, Pa.

GENERATOR SETS, trailer mounted, are available with diesel and gasoline motors, 50 or 60 cycles and in all standard voltages. Capacities from 10 to 85 kw. Made by International Diesel Electric Co., 1302 44th Ave., Long Island City, N.Y.

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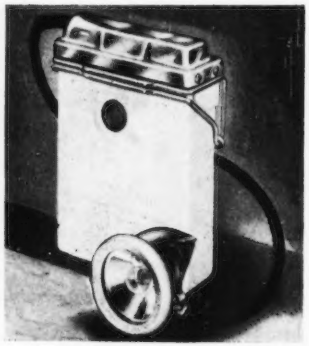
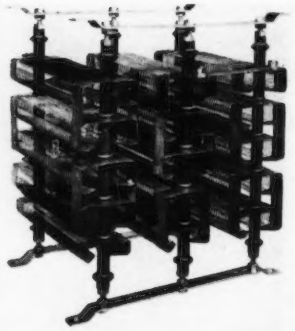
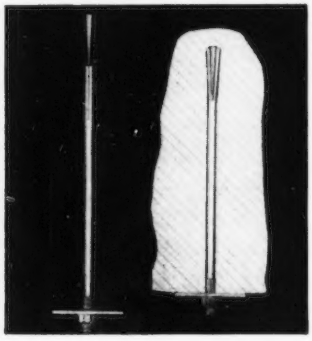


ELECTRIC CAP LAMP made from Butalite plastic is said by manufacturer, National Mine Service Co., to give 25% more light than previous models. Battery jar top is constructed of stainless steel.

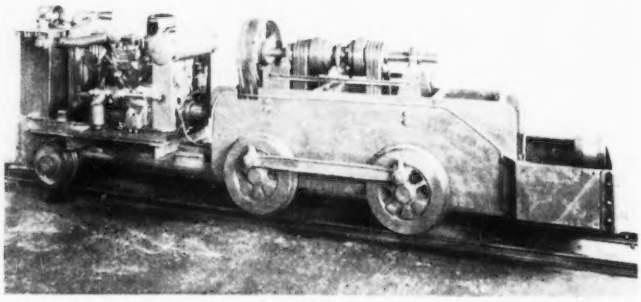


HIGH CURRENT RESISTOR uses precision cut sheet metal to make it light, sturdy and compact. Self-supporting, it is available from Exmet Electrical Corp., 59 Park Ave., New York., in rates from 20 to 80 amp.

MASONRY SAW has automatic blade pressure control. Weighs 225 lb. A 1½-hp. motor drives water pump and blade. Cuts dry or wet. Available from Victor Engineering Corp., Bristol, Pa.

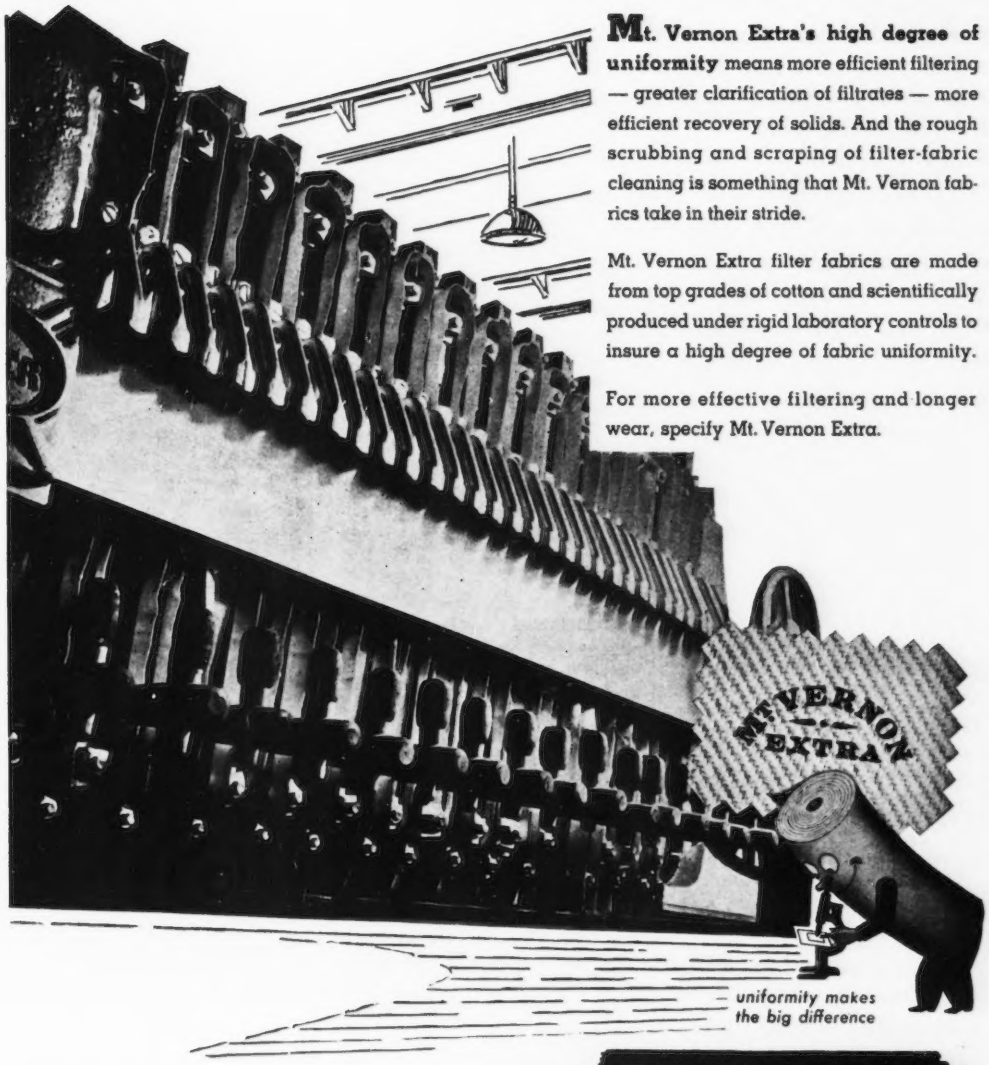


THIS NEW "SKYHOOK" is the product of Oliver Iron & Steel Corp., Pittsburgh 3, Pa. Long shaft of bolt penetrates and combines the strength of thinner roof layers so that they act as one heavy layer.



TRAMMER TYPE DIESEL LOCOMOTIVE developed by J. P. Ruth, Denver, Colorado, weighs approximately 2½ tons. The 20-hp. engine furnishes a drawbar pull of 800 lb. It can travel about 5 mph. with the engine turning over 200 rpm. Height of the unit is four ft. and the width is 33 in. It can negotiate a curve, 10 ft. in radius.

For More Efficient Filtering ...Mt. Vernon Extra



Mt. Vernon Extra's high degree of uniformity means more efficient filtering — greater clarification of filtrates — more efficient recovery of solids. And the rough scrubbing and scraping of filter-fabric cleaning is something that Mt. Vernon fabrics take in their stride.

Mt. Vernon Extra filter fabrics are made from top grades of cotton and scientifically produced under rigid laboratory controls to insure a high degree of fabric uniformity.

For more effective filtering and longer wear, specify Mt. Vernon Extra.

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● For record-breaking performance . . . for ease of operation, you can't top a McCarthy Vertical Drill. Recently, on one difficult job, workers using McCarthy equipment drilled an 8-inch hole 100 feet deep in only 40 minutes! The derrick is raised and lowered by hydraulic power . . . finger tip controlled . . . and a 60 H. P. gasoline motor is part of the standard equipment.

The McCarthy Vertical Drill, manufactured by The Salem Tool Co., is adaptable to high wall and key way drilling and diamond drill boring . . . drills 90% of all limestone and sand rock formations, and readily burrows through shale. Send today for complete information, and for a free copy of The Salem Tool Company booklet.

MINING EQUIPMENT
SINCE 1901

SALEM

THE SALEM TOOL COMPANY

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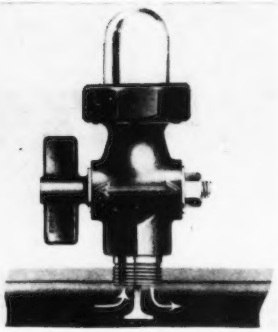
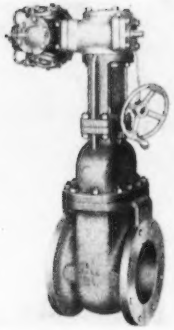


SIGHT GLASS enables observer to check clarity of liquid flowing under pressure. Valve permits removal for cleaning. Made by Worthington Pump and Machinery Corp., Harrison, N.J.



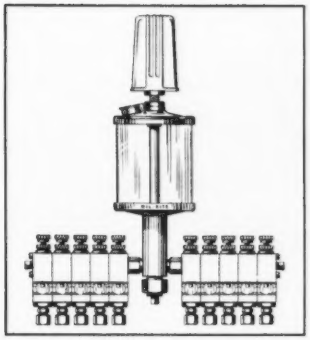
FLUID-MOTOR OPERATOR can be easily adapted to any standard gate valve. Unit comprising motor, gear box and yoke is bolted to bonnet. Made by Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.

NON-CORROSIVE "flex-i-liner" pump in which the flowing liquid or gas never touches metal parts, has been developed by Vanton Pump Corp., Empire State Bldg., N.Y. Sizes from 20 to 180 gph.

CHROME LOCK is felt, impregnated with zinc chromate to inhibit corrosion. Used for gasketing between all types of surfaces. Write Products Research Co., 5426 San Fernando Rd., Glendale, Cal.

POCKET SIZE slide table gives condensed conversion data for all types of industrial screen mesh. Readings are direct. Available free from McNally Pittsburg Mfg. Corp., Pittsburg, Kansas.

NON-ELECTRIC Alnico magnetic separator is permanent drum type made by Dings Magnetic Separator Co., 4740 West Electric Ave., Milwaukee, Wis. Can be installed at discharge of any chute.



ELECTRO-OILER is an entirely automatic lubricating device made by Oil-Rite Corp., 3437 S. 13th St., Milwaukee, Wis. Oil is released by solenoid operated valve through single or multiple sight feed valves.

INDUSTRIAL NOTES

William S. Lowe has been elected to fill the post of executive vice president of the **A. P. Green Fire Brick Co.**

Paul E. Thomas has become assistant to the general superintendent at **Carnegie-Illinois Steel Corp.'s** Gary works. Daniel E. Wise succeeds him as chief engineer.

Cameron R. Whitehorne has been appointed Comptroller of **The International Nickel Co., Inc.**

Hines Bearings and Industrial Supply Co., Billings, Mont., is now a distributor of **Hewitt** rubber products.

George F. Cooper has been named technical employment supervisor of the **Hercules Powder Co.**

Western Machinery Co. has been assigned full manufacturing and sales rights for **Steffenson Flotation Machines.**

B. T. Eagerton has been appointed vice president in charge of the Export Div. of **Nordberg Mfg. Co.**

T. M. Robie is now director of quality control for **Fairbanks, Morse & Co.'s** Beloit works. **J. W. Wright** succeeds him as manager of the Diesel Div.

Joy Manufacturing Co. has announced the acquisition of all capital stock of **Mines Equipment Co.**

Utilities Electrical Machinery Corp. has been reincorporated as **Utilities Machinery Corp.** with **J. W. Kohn** as president.

Alfred H. Ranger has been appointed plant engineer for the **Mack Truck Co.**

Paul A. McDonald has been promoted to district manager for **Euclid Road Machinery Co.**

H. H. "Hobe" Todd has been elected vice president of the **Hamilton Rubber Mfg. Co.**

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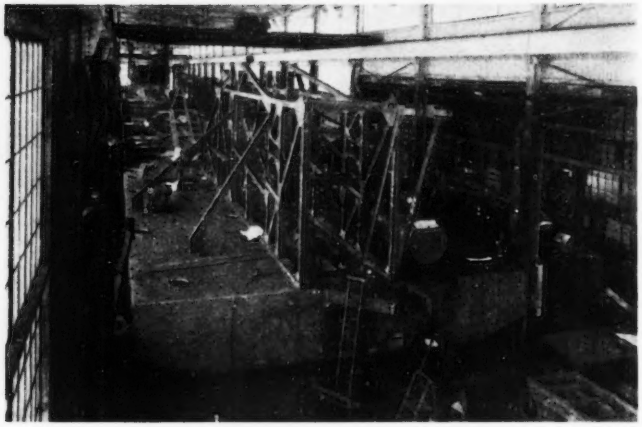
REGIONAL NEWS



THE FIRST NEW DREDGE for the Alaska gold mining industry since before the war has been fabricated by the Washington Iron Works of Seattle, Wash., for F. H. Molitor & Associates of Seattle for use on Gaines Creek on the Ophir district. The 73x37-ft. sectionalized pontoon steel hull, with steel framework, is shown above in the Washington Iron Works shop, before the steel housing was added. Equipment has been salvaged from a wooden hull dredge which was crushed in the ice and sunk in 1943. The new bucket dredge is of 3½-cu. yd. capacity.

ALASKA

★Gold production for 1948 was 248,395 fine oz. valued at $8,693,825, compared to 279,988 fine oz. valued at $9,799,580 in 1947. Decline came despite the operation of 19 more properties and two more bucket line dredges in large scale placer mining. Of total production, 98% came from 274 placers and 2% from lode mines. Leading producers were U. S. Smelting, Refining and Mining Co., New York-Alaska Gold Dredging Corp., Cripple Creek Mining Co., and Brinker Johnson Co.

★**New York-Alaska Gold Dredging Corp.**, working gold placers at Nyac on the Tulusak River, now has seven tractors and two bulldozers for road building. Thawing is unnecessary in this district. Earliest dredging on record started April 5 and the latest shut down was December 20.

ARIZONA

★Governor Garvey has rejected a demand from the Mine, Mill and Smelter Workers Union's Arizona council that he call a special session of the legislature to relieve unemployment in mining camps.

The union men proposed: 1, extension of the time limit and raising the amount of payments under the unemployment compensation act; 2, a state-wide public works program; 3, additional state welfare department appropriations; and 4, extension and broadening of the occupational disease section of the workmen's compensation act.

★Valuation of Arizona mining properties has been increased $15,317,002.74 to a total of $197,576,046.35.

In setting the figure, the state tax commission took net operating earning for 1948 as basis for the increases.

Only one mine, the Copper Queen branch of Phelps Dodge Corp., dropped in over-all value. The mine, which is inactive, was granted a $3,583,566 decrease.

Largest increase in the state was $8,869,843 on the Phelps Dodge Morenci branch.

The new valuation figure includes claims, $160,525,000; operating property, $37,051,046.35.

Valuations on the larger producing mines include:

Coronado Copper Company, $130,106.
Phelps Dodge Copper Queen, $16,179,133.
Castle Dome, $5,681,344.
Christmas Copper, $65,000.
Inspiration Copper, $18,304,000.
Miami Copper, $8,769,433.
Phelps Dodge Morenci, $75,341,591.
Tennessee-Schuykill, $91,500.
Eagle Picher, $1,146,405.
Kennecott Copper, $14,913,780.
Magma Copper, $7,143,997.
St. Anthony, $616,434.
American Smelting Co., $222,165.
Bagdad Copper, $1,649,425.
Phelps Dodge United Verde, $3,671,107.
Shattuck Denn Iron King, $2,195,120.
Phelps Dodge Ajo, $41,455,030.

★Wage losses and curtailment of production will cost miners in Arizona some $12,000,000 between May, 1949, and May, 1950—a 35 percent decrease from the wages paid in 1948.

Figures prepared by the Western States Chamber of Commerce indicated that about $7,000,000 of the decrease is from shortening of the mine work week from 48 to 40 hours and the rest from layoffs.

★Ray Mines Div. of **Kennecott Copper Corp.** is engaged in stripping an orebody for open-cut mining. Three shift operation removes 800,000 tons of overburden monthly. By the end of next year, monthly production from the deposit is expected to be about 9 million lb. of copper. Ray is adding a 10,000 kw. generator to its power plant and making additions to its crushing and grinding units to handle the added tonnage.

ARKANSAS

★The bauxite and aluminum processing plants at Hurricane Creek and Jones Mill peacefully and systematically shut down when negotiations between the Reynolds Metal Corp., and Reynolds Mining Corp. with the United Steelworkers (CIO) collapsed. Mining operations had previously been idled by striking workers.

★The State Geology Div. is in the process of conducting chemical tests on what may prove to be another source of Arkansas diamonds, according to Harold Foxhall, director. The new prospect, located near the operating mine of the Diamond Corporation of America at Murfreesboro, has been undergoing tests for a month.

CALIFORNIA

★More than 100 leasers are producing gold ore from deep workings of **Empire-Star** and **Idaho-Maryland** mines in Nevada County.

About 50 are at work on the 10,250 and 10,360-ft. levels of the North Star mine of the Empire Star group, developed to an incline depth of 11,000

ft. George Little and partners are working the company's Dannebroge gold property in Brown's Valley, shipping concentrates to the Empire plant at Grass Valley.

Some 60 miners are operating leases in the Idaho-Maryland mine. The ledge there, discovered in a virgin section of the old producer last year, is reported to be about 25 ft. wide, with most of the ore milling grade.

★**Yuba Consolidated Goldfields** is operating ten dredgers, seven in the Yuba River field near Marysville and two along Butte Creek in Butte County and the other in the Callahan area of Siskiyou County. The company reported it dredged 344 acres in the fiscal year ending Feb. 28, 1949, recovering 96,571 oz. of fine gold. Net earnings were $317,377.

★**Central Eureka Mining Co.** employees have agreed to take a pay cut to enable the company to keep operating its gold property at Sutter Creek in Amador County. Surface workers took a $40 monthly cut and miners are working on a straight wage basis, giving up a 50-cents-per-day bonus. Company officials estimated the saving at $4,000 or $5,000 monthly.

★**Royal Drift Mining Co.** is drilling at its placer gold property in the Magalia area in Butte County to locate the main channel, conducting the work from a 500-ft. tunnel in a virgin section. Exploration work last year disclosed pay gravel. The 1,200-acre property has a number of branch pay-streaks and deposits.

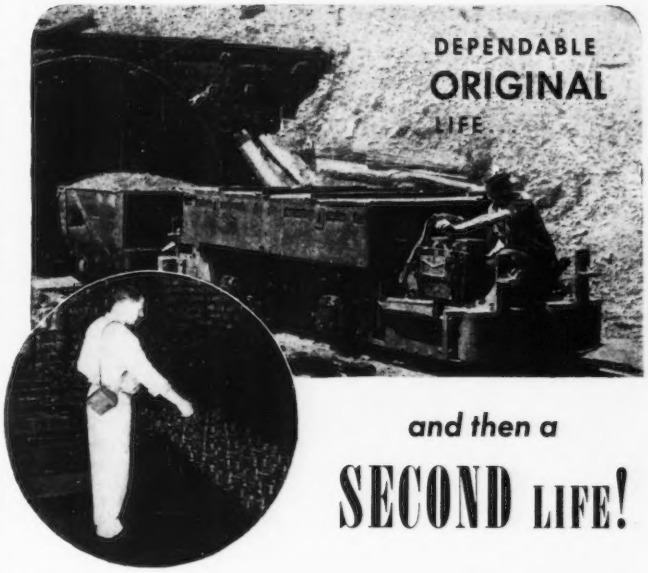
★**The Calaveras Central** placer property near Altaville in the Angels Camp area, Calaveras County, has been reconditioned under Harry Sears' management. Formerly gravel deposits on the property, one of the most productive on the Vallecito channel, were worked on a large scale to a depth of 350 ft.

★**New Idria Mining Co.** has received a safety award for operating its San Benito County quicksilver mines for 12½ years without a fatal accident. The award was made by the Joseph A. Holmes Safety Association.

COLORADO—June gold receipts down. ASARCO plants win national safety awards.

★Tin, tungsten and monazite are being recovered from tailings at the **Climax Molybdenum mine** as part of the company's program to recover all possible by-product values from its molybdenum operation. Wm. G. Coulter, manager, minimized the quantity of tin recovered. "We're getting some tin," he said, "and its worth recovering."

★**Front Range Mines Inc.** reports a rich gold strike at Cripple Creek in the **Strong mine** at Victor. John Deer-



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Colorado *(Continued)*

sen, company president, said the ore was found at 2,100-ft. depth in a vein 4 ft. 7 in. wide. Diamond drilling operations have been started to determine full extent of the vein.

★South Burns shaft of the **Acacia Mining Co.** at Cripple Creek has been leased to **Trand Mining and Leasing Co.**, who have started repairing the surface buildings and are now pushing underground work.

★A new discovery of vanadium and uranium-bearing ore near Rico has been reported. Discovered by Louis and John Downing, long time carnotite miners, the ore deposit was found in the Entrada strata on the opposite side of the mountain from the famous Hermosa Creek mines. **Minerals Engineering Co.** has contracted development and is now moving in equipment.

★Gold receipts at the Denver mint, continuing their long decline, came to 31,651 oz., valued at $1,107,808, in June. Receipts in June, 1948, were 40,082 oz., worth $1,402,891. Silver receipts for June totaled 10,437 oz. worth $9,289, compared with 9,551 oz. worth $8,468 in June, 1948.

★Anthony C. Moschetti, Bureau of Mines engineer in Denver announced award of top national safety honors to two Colorado plants of **American Smelting and Refining Co.** The Globe plant in Denver with 159 employees, was judged the safest non-ferrous refinery with only three accidents and 10 days lost in 1948. Safest non-ferrous smelter was the plant at Leadville. Among 233 employees, one accident caused five lost days.

★U. S. Senate appropriations committee has recommended a sum of $500,000 for further driving of the Leadville tunnel. It is believed that this is enough money to drive the tunnel 2,600 ft. to the Hayden shaft.

★Roy Van Houten is reopening the **Chipeta Tunnel**, one mile north of Ouray. The tunnel had been driven in 3,700 ft. and wide enough for a double track. Present work is preliminary.

★A crew under J. N. Nosser, Los Angeles engineer, has started work at the **Ruby Basin mine** near Silverton. Plans call for opening up the portal, retimbering a 2,000-ft. tunnel and extensive sampling. The mine, under lease to H. Barkhage, is owned by Tom Edwards of Los Angeles.

★Aspen is noting a quickening in mining activities. **Anaconda Copper Co.** is prospecting at several properties to see if sufficient lead and zinc are available.

★**Lupton Mining Co.** of Georgetown is driving a 1,500-ft. tunnel under its Great Grizsly Gulch group of mines in the Argentine Quadrangle above Silver Plume.

★**Slate River Mining Co.** is moving in machinery and materials for installation of a 2,000-ft. aerial tram at the Eureka project on Treasury mountain. Tram will haul down ore from the mine opening, 13,200 ft. above sea level.

GEORGIA

★**The General Reduction Co.**, Macon, has been taken over by the Diversey Corp. of Chicago. Under new management the filtering clay plant will be modernized and the output of fuller's earth increased. A research program is planned. J. Slocum, son of the company's original founder, will be retained as plant manager. J. C. Glassner, of Diversey Corp., will be president of the reorganized company.

IDAHO—Miners' vote authorizes strike. Development work is extensive.

★**Hecla Mining Co.** has resumed operations at its Rock Creek subsidiary project in the silver belt midway between Wallace and Mullan. A bulldozer is stripping an extensive mineralized shear zone about 1,500 ft. south of the present face of the lower tunnel. The management has not announced if or when work will be resumed in the lower tunnel.

★**Sullivan Mining Co.**, a subsidiary of **Bunker Hill and Hecla**, is concreting a large underground compressor room at the upper Star mine tunnel at Mullan. The Sullivan company has recently purchased a number of residence houses in Mullan for use of its employees and it is understood that most of its mine workers will use the Mullan entrance as a matter of convenience. Formerly the mine crew had to go to Burke, be lowered 2,000 ft. down the Hecla shaft, transported two miles on an electric underground train back to Mullan, and then hoisted to their working places in the Star mine.

★**Sunshine Mining Co.** has established a free miner's bus route between the Sunshine mine and Mullan to accommodate a number of Mullan miners employed at the Sunshine. **Frank M. Hardy**, treasurer of Sunshine, reports that the company earned $319,024.55 in the second quarter of this year as compared with $351,796.96 for the corresponding quarter in 1948. On June 30 the company had an earned surplus of $4,848,503.74 with outstanding liabilities of $1,100,302.04.

★**The Hansy Copper and Gold Mining Co.**, operating near Adair, has been financed by a group of farmers in the wheat belt southwest of Spokane. The company has an exceptional showing of rich copper ore, trial shipments of which have been sent to the Anaconda smelter. The mine is managed by Sam Peterson, son of the discoverer.

★**Silver Dollar Mining Co.** is driving the Hershey crosscut from the 1,800-ft. level. Recommended by the late Oscar Hershey, geologist for the Bunker Hill, the crosscut is headed into the Purim claim owned by the **Hayden Hill Mining Co.** and held under lease by Silver Dollar. The crosscut is now in a distance of 800 ft. and is destined to intersect any veins in the silver belt south of the Chester vein system.

★**Callahan Consolidated Mining Co.** is again working in the long north crosscut in the Coeur d'Alene Mines shaft on the 2,800-ft. level, intending to drift prospect several promising veins. The company is now driving a drift on the **American Silver Mining Co.'s** vein which shows a strong fissure of quartz and siderite common to veins in this district.

★**Caledonia Lead-Silver Mining Co.**, which is sinking a shaft under the main street of Wardner, reports that crosscut work on the 500-ft. level has crossed through the Osburn and Alhambra faults and has entered virgin ground favorable to ore deposits.

★**Atlas Mining Co.** at Mullan has levied a small assessment to carry on necessary repair work. Atlas was formerly under lease and bond to **Hecla Mining Co.**, who put down a three-compartment shaft to a depth of 800 ft. and drifted in excess of 1,000 ft. A promising vein of galena ore of milling grade was opened, but the option was surrendered because of war conditions.

★**Goldback Consolidated Mines Co.**, recently organized to take over the Monarch mine and other mining property near Murray, has entered into negotiations to purchase the Square Deal milling plant on Prichard Creek below Murray. The mill has 100 tons rated capacity. Originally built as a gold mill, it was later redesigned and equipped to treat custom lead-silver ores. The Goldback company proposed to treat zinc-lead ore from the Monarch mine.

★**Bismark Mining Co.**, operating a group of claims adjoining the Sunshine Consolidated on the west fork of Big Creek, reports striking a promising vein system after driving a long crosscut tunnel. The vein is not commercial as developed to date, but picked samples assayed 17% lead and 16 oz. silver per ton.

★**Hunter Mining Co.**, which recently suspended underground mining operations at Mullan, is now milling semi-oxidized material from old surface dumps.

★According to **Silver Syndicate Mining Co.'s** annual report, the mine has produced 4,000 tons of silver-lead ore per month for the first five months of 1949, 3,000 tons of which came from stoping operations and 1,000 tons from development work. Total production of the mine in 1948 was 21,516 tons, 20% higher than in 1947. Gross

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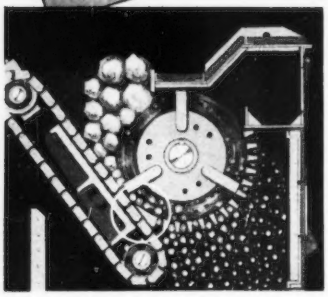

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Idaho *(Continued)*

smelter returns for 1948 totaled $362,518.95 and Silver Syndicate's part of this amounted to $127,586.31, representing a half interest. Sunshine owns the other half. The report says, in part:

"The 3,700-ft. level was driven to the west end of the 'Rambo' area. The 3,500-ft. level was established by drifting along the vein eastward from the Jewell shaft, and a northwest cross cut was completed from the shaft to the Silver Syndicate fault on this level. No ore was found in the fault near the west end of the 'Rambo' area on the 3,500-ft. level. The 3,500 east drift was advanced 235.2 ft. along the vein, of which 199 ft. were in ore."

★Ross Roundy, president and general manager of **Sun Valley Silver-Lead Mining Co.** near Ketchum, Idaho, is installing electric power supplied by the Idaho Power Co. The Sun Valley Co. has recently completed a crosscut tunnel and opened a silver-lead vein and is now building ore bins to handle the shipping grade part of production.

★**Palisades Mining Co.** has awarded a contract for extending an 800-ft. crosscut tunnel which is at an elevation of 6,000 ft. on the west fork of Pine Creek to prospect two veins uncovered in forest service road work. The west fork of Pine Creek has several prominent surface outcrops but the district has never been prospected at depth.

★**Sunshine Consolidated Mining Co.** is driving a new crosscut from the 2,700-ft. level to open the Sun-Con vein 400 ft. above the present working level. At the same time they are driving a raise from the 3,100-ft. level to connect with the crosscut. Crosscut work is advancing 200 ft. per month. Stoping operations on the vein are being continued from the 3,100-ft. level.

★**Golconda Lead Mines Co.** has received from the Bunker Hill smelter $29,026 in payment for 150 tons of silver-lead concentrates shipped recently. Three carloads averaged 74.68% lead and 72.5 oz. in silver per ton, or a net value of $203 per ton. The ore averages only about 4% zinc.

The company has opened the Golconda vein further east in the Square Deal ground and is drifting easterly on the vein which shows streaks of good grade milling ore. The vein was faulted near the adjoining claim lines and was picked up by diamond drilling at a point 60 ft. north of the strike of the vein in Golconda ground. The diamond drills showed a mineralized vein structure 20 ft. wide but considerably broken up by fault movement. The present drift work still shows a disturbed condition, but is gradually getting into more solid ground. Golconda company owns a large block of Square Deal stock and in addition holds a 50-50 ore production agreement.

★Contemplated expansion of production from the **Federal Page** mine at Kellogg has been suspended because of the drop in lead and zinc prices. The company planned to increase mine production from 500 to 750 tons daily with a corresponding increase in milling capacity. Last year the Page mine produced 159,179 tons of ore with a gross value of $5,331,606 and net earnings of $2,763,907.

★**New Rainbow Mining Co.**, operating in unexplored territory west of Kellogg, is awarding a contract for 700 ft. of tunnel work to get under a large surface exposure of vein matter uncovered by bulldozer operations. The company had driven the tunnel in a distance of 75 ft. and cut through a vein near the portal which carries silver, lead and zinc values. This year the company has built new mine buildings, installed a water system and diesel-powered air compressor plant.

★Development work at the **Hope silver-lead mine** at Clark's Fork, has recently been changed from a crosscut to the Elsie K vein on the 700-ft. level to a drift on the Pearl vein. Stoppage of the Elsie K crosscut is only temporary until the drift on the Pearl vein can be gotten under way. The Pearl structure in Hope ground was prospected by Government diamond drilling during the war and the Hope Co. put down a deep shaft to intersect the structure.

★**Clayton Silver Mines Co.** reports the completion of its main shaft to the 400-ft. level and a crosscut driven to the vein. Clayton's former production has been from above the 300-ft. level, where large orebodies have been mined. The 400-ft. level is the first attempt to deeper work.

★**Hansey Gold & Copper Mining Co.**, three miles east of Adair, Idaho, is blocking out high-grade copper ore on three levels and is constructing 100-ton capacity ore bunkers, preparatory to starting regular ore shipments to the Anaconda smelter, according to Sam Peterson, general manager. Average assays of the ore run 15.4% copper, 0.14 oz. in gold and 2 oz. silver per ton. Present stoping operations are being confined to a 6-ft. wide solid streak of high-grade ore on the footwall, said Peterson, but the vein shows a width of 25 ft., as proven by drill holes on the hanging wall side. The forest service is constructing a road to the mine.

★**Sunset Minerals**, operating the Liberal King mine on Pine Creek, has made arrangements to step up its ore production to 125 tons per day as soon as lead and zinc prices warrant, according to Bliss Moore, vice president and general manager. The company's mill has been treating 100 tons daily.

★For the six months ending June 30,

1949, **Federal Mining Co.** reports a net profit of $1,192,949 as against $937,005 in 1948.

★Three local unions of the International Union of Mine, Mill and Smelter Workers (CIO), including Kellogg, Wallace and Mullan have voted 4 to 1 in favor of a strike when and if the union negotiating committee says it is advisable. About 4,000 lead, zinc and silver miners are involved. Contract negotiations will be resumed under Lewis Zinman of the federal mediations service. The union is asking a 25c. hourly wage increase and a health and welfare fund. Operators have offered to continue the present contract with current wages, the highest of any metal mining district.

IRON COUNTRY— Federal aid for iron powder plant not likely this session.—Oliver will mine ore under Hibbing.

★Fifteen or twenty years ago it was thought that little stripping remained to be done on the Minnesota iron ranges. In 1948, however, a total of 72,876,409 cu. yd. was moved of which about 65% was in St. Louis County. Itasca County (in which falls the western portion of the Mesabi range) contributed 16½ million cu. yd. and the Cuyuna range nearly 9 million. With the introduction of more efficient equipment for stripping and for beneficiation of lean ores, it is probable that large yardages of stripping will continue to be removed in the coming years.

★The Hill-Annex mine of **Inter-State Iron Co.** at Calumet is excavating in preparation for the addition to its washing plant which will be made after shipping stops. It is also preparing a new tailings pond on one of the old dumps near the plant. This will be required at the expiration of the present lease, in which the **Great Northern Iron Ore Properties** participate. The mine is loading some ore from Delaware No. 1 for **Oliver Iron Mining Co.**

★**Snyder Mining Co.** is doing further exploration drilling at its Martin mine near Ironton, Minn. The mine was last operated by M. A. Hanna Co. in 1946.

★An explosion of still undetermined cause occurred July 2 at the taconite concentrator of the Erie Mining Co. near Aurora. The explosion occurred in a four-story building housing the pellet furnace. Two deaths resulted.

★The appeal for $200,000 in federal funds to continue experimental work at the Aurora iron-powder plant appears to have been lost for this session of Congress. This plant built by the State has been operated by Continental Machines, Inc., for the purpose of making iron powder from taconite in

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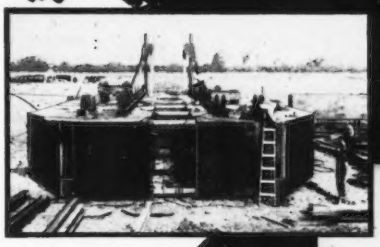

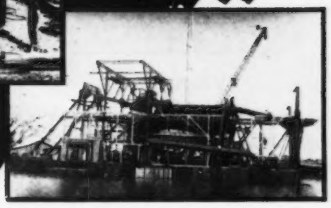

Yuba pontoon-type portable hull and superstructure being erected by Yuba erection crew in a California placer gold field.

Consult Yuba for dependable help on design and material selection . . . wood, standard steel, portable pontoon-type.

Whether you should choose wood, steel or pontoon-type hull for your dredge, depends upon proper evaluation of many important factors, such as your operating conditions and the cost of wood compared with steel delivered at operation site. Thus the overall picture is necessary to provide a hull and structural members best adapted to the expected life of the dredge and to insure an economical installation.

Initial Design Can Provide for Changes

For a Siskiyou (California) operator, who knew he would encounter deeper gravel in a few years, Yuba designed a hull and bucket ladder which could be lengthened in the field. Recently the change-over was made, altho structural changes were anticipated several years ago, before World War II. The dredge now is working much deeper ground and without deviation from original plans.

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In every case, Yuba engineers consider all factors, including location and shipping facilities, when designing or rebuilding your dredge. Hulls, digging ladders, superstructure, spuds and other structural members all are built for easy shipment, even under primitive hauling conditions, and each part marked for quick field erection.

You can profit from Yuba's 40 years of continuous experience in bucket ladder dredge design and field construction. Consult Yuba NOW. No obligation; just wire or write—

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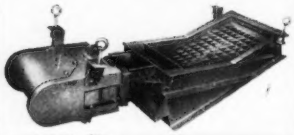

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Iron Country *(Continued)*

which the iron occurs in the form of carbonate. The Senate sub-committee on interior appropriations voted out a money bill which did not include the Aurora fund requested by Senators Thye and Humphrey and Representative Blatnik of Minnesota.

★**Inter-State Iron Co.'s** Grant mine expects to have its Heavy-Media plant in operation early in August. This will be the first such plant for the company. It will be followed next season by a larger unit at the Hill-Annex mine at Calumet.

★**Oliver Iron Mining Co.** has filed a notice with the Village of Hibbing calling for vacating a portion of Third Avenue between North and South Hibbing from a point near Bennett Park to and including the bridge. The notice is in accordance with an agreement made in 1903 between Russell M. Bennett and others with the Town of Stuntz. It states that the company "is about to mine and remove the iron ore in and under the portion of said lands now known as Third Ave." The company agrees to leave the street in use until May 1, 1950.

★**Cleveland-Cliffs Iron Co.** is installing an inclined belt conveyor in its Cambria-Jackson mine at Negaunee. To be constructed on a 15 degree incline, the conveyor will be 594 ft. long and have a vertical lift of 110 ft. It will raise ore from the 7th level.

★**Inland Steel Co.'s** Greenwood mine at Ishpeming has reduced its operations to a basis of one shift per day, requiring the release of 55 employees. R. D. Satterley, general superintendent of Inland's ore mines, explained: "Inland's requirements of Greenwood ore can be satisfied for an indefinite period at this rate of operation."

★**Calumet & Hecla Consolidated Copper Co.** has informed its union bargaining committee that a wage cut of 20 cents per hour for all classifications must go in effect because of the continuing instability of the copper market and critical financial condition of the company. Even with a wage cut, the company would not give any assurance of resuming operations in 1949 or 1950. Neither would the company promise a five-day work week. It estimates that, if production is resumed, about 100 men would not be recalled.

★Mines of **M. A. Hanna Co.** in the Iron River district have gone to four days per week operation instead of five days. Mines affected include the Homer-Minckler, Wauseca, Hiawatha No. 1 and No. 2 and the Bengal. These mines employ between 500 and 600 men. None have been laid off at this time.

★**Cliffs Power & Light Co.** is laying a water pipeline from the new Lake Angeline, east of its old Lake shaft, to the big stream generating plant that it now has under construction. This will insure a water supply for the plant during dry seasons.

★Shipments of iron ore from **Steep Rock Iron Mines, Ltd.,** so far this season have exceeded 400,000 tons. The ore is shipped from docks at Port Arthur, Ont.

★**Inland Steel Co.'s** plan for pensions, group insurance and hospital benefits, which was offered to union locals 1010 and 64 has not, we believe been accepted. It seemed like a long step in the direction of what has been demanded of the steel companies. An average worker who elected to join the plan at 30 would be able to retire at 65 with a pension of $163 per month, including social security benefits. He would be entitled to $5,500 group insurance and $35 per week for 13 weeks non-occupational accidental health benefits, besides other provisions. It sounds like a plan worthy of serious consideration.

★Hurley, Wis., on the Gogebic range, is having difficulty in locating a new source of water supply. Its present supply comes from Lake Lavina but it is limited. Exploration wells drilled to date have been disappointing.

★At Negaunee, the **Cleveland-Cliffs Iron Co.** is driving a minus-15° slope below the 7th, or 1,500-ft. level of its Cambria mine which will be used for installing a 600-ft. belt conveyor for raising the ore below the 7th level to the pocket on the level, from which point it will be hoisted to the surface. The conveyor belt will be 36 in. wide. On this level is a 30-in. gage track used for taking timber and supplies below the 7th level. William Atkins is superintendent of the Cambria. The installation will be ready about Nov. 1.

★Sinking was completed at **Cleveland-Cliff's** Mather "B" mine at Negaunee, on Aug. 4. Total depth is 3,089 ft. This includes room for pockets on the 3,000-ft. level. The Nordberg hoist for the skip is being installed. A contract has been given to A. Prokst & Co., at Iron River, Mich., for erection of shops, change house, warehouse, heating plant and office. Work is being rushed to get them under cover before snow falls.

★The new Research Laboratory of **Cleveland-Cliffs Iron Co.** was formally opened at Ishpeming, Mich., and inspected by visiting mining men.

MICHIGAN—Relief by Federal Subsidy is sought for mines in Copper Country. Prospecting for uranium is active.

★All interests concerned with the well-being of the copper mining industry in Michigan are working desperately to bring some measure of relief in the form of a subsidy for the **Calumet & Hecla** and other operations in the district. Included are the local

businessmen, representatives of organized labor, state legislators and Congressman John B. Bennett of the 12th Michigan Congressional district, assisted by Governor G. Mennen Williams, and the Michigan Economic Development department.

Governor Williams has made public a report, prepared at his direction by the Commission, which claims that proposed subsidies for the copper industry will cost taxpayers half as much as welfare relief will cost if the industry is permitted to collapse. The report has been sent to all Michigan congressmen and heads of federal agencies concerned. It follows a visit to Washington of a Michigan group to urge passage of legislation proposing the subsidies. Clinton Fair, secretary to the Governor, accompanies the group to back up pleas of Rep. Bennett for government action.

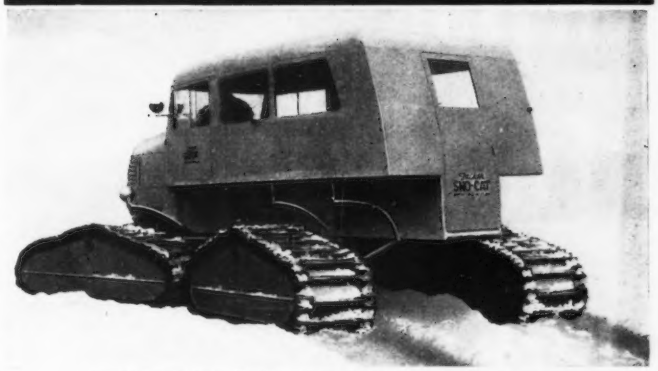
"With direct relief now costing more than $100 per month for a family of four," the report says, "and with thousands of families afflicted, the simplest computations indicate clearly that the annual cost of such relief is at least double the possible cost of the plan to provide an incentive for the continued operation of the mines."

The report recounts that the price of copper fell in May from 23½c. a pound to 16c., forcing most mining operations to stop. Without relief soon it is said, the companies will have to stop pumping and let the mines flood. When that happens, the report states, "major copper mining in Michigan will have reached its end." Copper was a critical commodity during the war, the report states, and in another war, the total loss of the Michigan deposits would prove a serious blow. Even though it is deep, expensive to mine and low in grade, the remaining tonnage of Michigan copper ore is considerable. To permit the total collapse of the industry in Michigan would mean dissipation of skilled labor forces and a serious economic blow to the Copper Country.

★No uranium thus far, but a generous amount of rock and other non-uranium bearing minerals is being sent by prospectors to the Michigan Geological Survey. The Survey recently offered to examine ore specimens sent in by prospectors who think they may have located some radio-active pitchblende. The Conservation Department's Lands Division has received applications for prospecting leases from three parties covering nine separate state-owned 40-acre parcels. Some mineral specimens from Michigan have been examined by the Atomic Energy Commission and found to contain thorium instead of uranium. Both thorium and uranium will register on a Geiger counter.

★Diamond drilling is again being done at the White Pine tract of Copper Range Co. The company expects to continue plans for developing the property notwithstanding the lower price for copper.

No Snow Too Deep - No Road Too Steep



Sno-Cat Double Drive Freighter Model #643 140 hp. Carries 15 passengers and hauls heavy freight loads with trailer. Climbs grades to 65% on snow.

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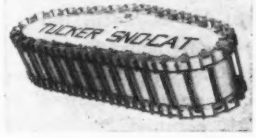
Model 443 Utility Double Drive 8-passenger 3-door sedan, 95 H.P. Climbs grades to 65%



Sno-Cat's exclusive sliding pontoon. Sinks in less than a man on snowshoes.

Model 524 commercial 7-passenger 4-door sedan, 115 H.P. Climbs grades to 35%

- **OVER DEEP COVERED ROADS**
- **ON STEEP SIDE SLOPES**
- **THROUGH WOODED AREAS**
- **THROUGH DEEP FRESH SNOW**
- **AND UP STEEP GRADES**

The amazing Sno-Cat will reach isolated places in a few hours where normally it would take days of tedious travel by ski or snowshoe. The Sno-Cat's ability to haul pay loads over any depth or condition of snow, to climb steep grades and cross severe side slopes plus its economy of operation make it a "must have" for all types of outdoor industry in snow country.

HERE'S WHAT USERS SAY:

". . . before securing the Sno-Cat, the egg-taking crews had to snowshoe into these lakes and pull their supplies by toboggan sled. This, of course, was a long and tedious process. At the present time, by using the Sno-Cat, a whole crew can be transported in a few hours where it would have taken two days on snowshoes. This year when the crew went in to Diamond Lake, they pulled a trailer with the Sno-Cat and took in approximately one ton of supplies . . ."
From Oregon State Game Commission Letter of May 26, 1949

". . . we are convinced by actual experience that the Tucker Sno-Cat will carry men and materials to isolated places over snow covered terrain with steeper slopes than is practical or possible with any other type of mechanical equipment with which we are familiar."
From Salt Lake Pipe Line Co. Letter of March 8, 1949 (Subsidiary of Standard Oil Company of California)

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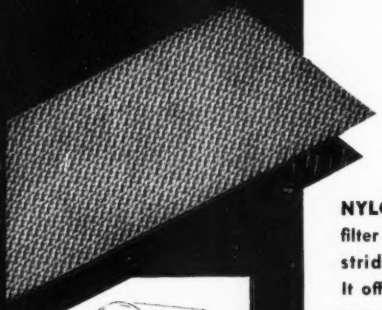
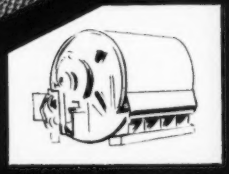
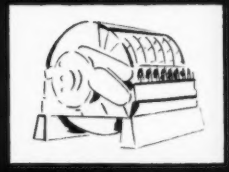




DRUM FILTER



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MONTANA

★**Perry-Schroeder Mining Co.**, which has been operating a 6-cu. ft. dredge near Canyon Ferry on the Missouri River, is converting the dredge for excavating and washing sand and gravel in the construction of the Canyon Ferry dam.

★**Bagdad Mining Co.**, Boise, Idaho, is preparing to develop a group of lode and placer claims in Williams gulch, 30 miles west of Phillipsburg. Work will be supervised by F. S. Neal and W. L. Degenhart of Montana Mining and Engineering Co.

★**Taylor All-Metals Concentrator Inc.** is carrying on tests with a new concentrating unit on mine and mill tailings of placer, gravel and lode ores at Boulder, Jefferson County. Machine was invented by Mastin Taylor, vice president of the company.

★**Coghlan-Hogan Gold Mining and Reduction Co.** has started operations on three claims southeast of the **Revenue mine**, near Norris, Madison County. Ben Hatfield has been appointed director of operations.

★**Zonolite Co.**, Libby, reports earnings of over $520,000 for the year ending March 31, 1949, compared with $356,000 for the previous year. In June the company declared a 10c. dividend on its 984,112 outstanding shares. Zonolite is the largest producer of vermiculite in the United States.

★**Carbonate Mines Inc.**, a subsidiary of **Silver Dollar Mining Co.**, operating in the Bald Butte section of the Marysville district, has extended its drift 500 ft. They expect to drive an additional 1,500 ft. to a vein discovered on the surface which showed good surface values in lead and silver.

★A consolidated Montana District Land Office was opened August 1. Located in the Federal Building at Billings, it will provide more prompt and efficient service to users of the more than 5,200,000 acres of public land in the state.

NEVADA

★It has been announced that a Nevada corporation has been formed to erect a 100-ton custom mill in the Tonopah area. The site has been selected and plans call for having the building ready for the installation of equipment before cold weather sets in.

★**The Harvey Mudd** organization of Los Angeles is diamond drilling the **Alexander** and **Brooklyn** mining properties at Grantsville. Two holes have been completed; one to 600 ft. and the other a little deeper. The flow of artesian water from one of the holes would be enough for milling purposes if the mill on the property is placed in commission again.

★With known ore reserves increasing

steadily, the new Goldfield mill should soon increase from its semi-pilot operations to full scale capacity of about 300 tons per day. There is some alarm over rumors that the smelter to which concentrates are being shipped may close down because of curtailed metal production in western mines. This would leave the Goldfield operation with plenty of ore and gold concentrates but no disposal point within practical reach.

★The 50-ton mill at the **El Dorado Gold Mines Ltd.** property in the Awakening district, 48 miles northwest of Winnemucca has started operating. Extensive development work, the starting of diamond drilling from the 400-ft. level, and the beginning of a 600 to 800-ft. tunnel are in progress.

★**Nivloc Mines** plans to mine a gold-silver-lead ore from its property west of Silver Peak, near Goldfield. A hoist will be installed on a winze from the 700-ft. level, a bigger hoisting plant will be placed at the main shaft, and mining will be done to a depth of 1,100 ft. The management plans to ship the richer ore to a smelter. Some of the product comprising the leaner ore, will be trucked to the Newmont mill at Goldfield.

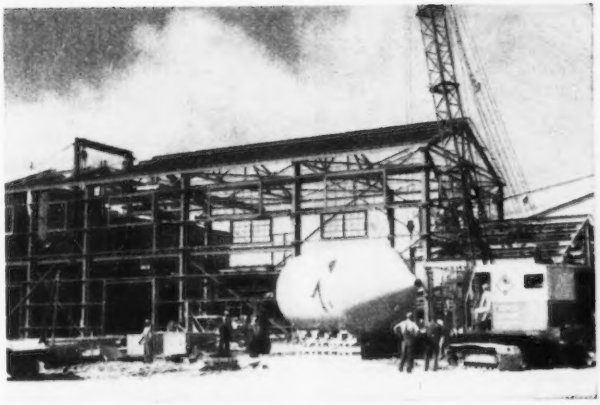
★The **Nevada-Massachusetts mine** at Tungsten has shut down, and the remainder of a crew of 150 has been laid off. C. H. Segerstrom, president, gave low demand for tungsten, low metal prices and foreign competition as reasons for closing. A 10-man maintenance crew has been retained to keep the mine ready for operation at any time.

NEW MEXICO

★While metal mining has slumped in New Mexico due to lack of demand and lower prices, two of the non-metallics continue active—potash and pumice.

International Minerals & Chemical Corp., Carlsbad, reports that its employees have just finished their most prosperous year. During the fiscal year, July 1, 1948, to July 1, 1949, the average International employee at Carlsbad received in wages and bonus $4,343.71, as compared to $4,063.20 in the previous year. Only 97 out of an average of 766 employed in the operation severed connections during the past 12 months, about 1% a month.

★**The Cochiti Pumice Co.**, the Pumice Aggregate Sales Corp. and the General Pumice Co., of Albuquerque and Santa Fe, have filed a complaint with the Interstate Commerce Commission, asking that a rate hearing be held at Albuquerque. They charged that they are being charged unreasonable rates for shipping pumice aggregate to eastern points as compared to rates charged shippers of clay, shale cinders and expanded slag, competing materials.



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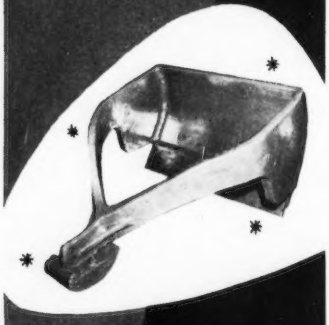

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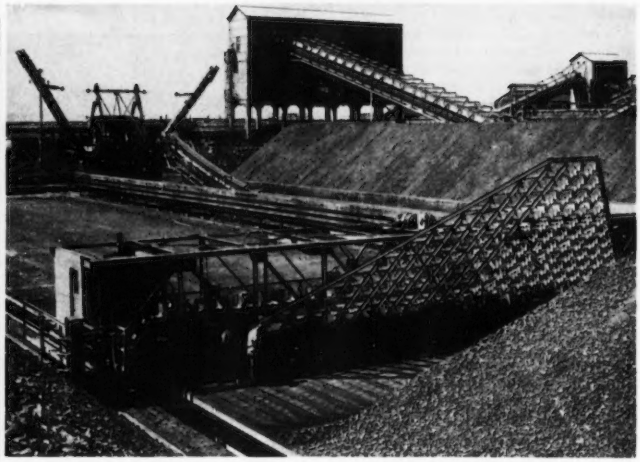

JIGGLING HARROW cuts a crosswise slice from the end of an iron ore pile of Geneva Steel Co., Geneva, Utah. Each "slice" contains a part of every layer previously stacked lengthwise by twin mechanical boom (left background). The ore is thus blended to make it more uniform for charging into blast furnaces. The nearly vertical harrow loosens a slice of ore, letting it fall into a trough (where man is standing). Plows mix it further and push it on to a traveling hopper. A conveyor belt then carries it to the screening station where it is separated into three sizes.

NORTH CAROLINA

★**Blue Ridge Minerals and Mining Co.**, of Forest City, N. C., has obtained a certificate of incorporation from the Secretary of State, to engage in general mining. Incorporators are Thomas Moss, Carl Hutney and Oscar Mooneyham of Forest City.

OREGON

★James M. Orr of Portland, will mine 1,500 tons of limonite from the Scappoose district and send it under contract to a gas company in British Columbia. It will be used in gas purification.

★More than 100 tons of scheelite has been shipped from the **Bratcher property** near Ashland, for processing at the **Tulare County Tungsten Mines** mill near Lindsay, Cal. Exposed ore zone is 4 to 12 ft. in width, but length and depth are undetermined. Five men are employed at the mine.

★**Standard Mine**, in the Quartzburg district of Grant County, has been leased by Bert Hayes of John Day. The lower tunnel is being reconditioned.

★Fire which threatened serious damage to the shaft of the **Virtue mine**, 11 mi. east of Baker, was brought under control by Baker city firemen using forest service pumps. Firemen entered the mine below the blaze through a crosscut tunnel. The fire started from an exhaust pipe of a motor driving a pump. Distance from timber and flooding caused the closing of this high-grade gold producer. "Prospect placer" work is now under way to study the geology of the vein heretofore hidden by water in the shaft.

UTAH

★U. S. Commissioner of Reclamation Michael Straus, visiting Salt Lake City with officials of the Department of Interior and other interested agencies to survey Upper Colorado River dam sites, reported "hope for approval of a proposed $20,000,000 diversion tunnel project to drain Park City district mines."

The tunnel proposal, long under discussion in the region, is included in a report on the Central Utah Project report being prepared for submission to Congress by Division Three of the Reclamation Bureau.

★William E. Warne, Assistant Secretary of the Interior, has reported (July 27) that plans are being worked out to settle Navajo Indian workmen in an off-reservation center at Bingham, Utah. Several hundred Navajo workmen have been employed successfully at the **Kennecott Copper Corp.** open mine at Bingham. However, provision of adequate living quarters for the Navajo group has been a problem, with the men sometimes tending to drift back to the reservation to be

near their families even though satisfied with wages and working conditions.

Warne, who has supervision of Indian Affairs for the Department of Interior, believes provision of an off-reservation living center would solve the problem. From the administration standpoint, it might be linked with the $3,500,000 off-reservation Navajo school now under construction at Brigham City, about 100 mi. north of Bingham.

★**Silver King Coalition Mine Co.** has reported a net loss of $241,866 for the second quarter ended June 30, 1949. The firm suspended activities at Park City on that date due to the wage-pricing problems that likewise forced the shutdown of all other major Park City district operators. Management attributed the loss to "disparity between prices of metals and wages paid". The net loss was figured after all taxes and depreciation but before depletion.

★Paul H. Hunt, vice-president and general manager of **Park Utah Consolidated Mines Co.** and F. A. Wardlaw, Jr., general manager of the **International Smelting and Refining Co's** Utah operations both stated last month that Utah's mine industry would benefit if the wage scales in lead-zinc mines and smelters could be divorced from the state's copper industry.

The issue was brought forward during wage negotiations in both industries. Mr. Hunt pointed out "the lead-zinc mine producer gets some 45% of the gross value of his zinc from the smelter as against 75 to 80% for the copper producer. At the same time, labor cost for underground mines account for 65 to 75% of expenditures for lead-zinc producers, compared with 22% for the open-pit mining of copper."

Hunt noted that wage scales of lead-zinc producers, had been attached in past years to scales paid open pit copper miners, "and that is no longer possible".

★The picture in Utah's lead-zinc-silver fields, where a trio of major mines have been shut by the combination of metals price and labor cost problems may shortly change for the better, according to members of the Utah Mining Assn. James R. Richardson, secretary-manager of the association, summed up the situation by stating "if past wage scales are maintained without increase and if the metals price rise continues there is real hope for reopening of major mines in the near future." The fact that **U. S. Smelting, Refining & Mining Co.** has signed a renewal of last year's contracts with Progressive Metal Workers Council locals at Lark, Bingham and Midvale is thought to be an indication that other negotiations, suspended in mid-July, may be renewed on the basis of 1948 contracts and signed without pay boosts. Utah operators and union men are also

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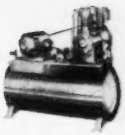
MODELS NUMBER 20 AND 35 COMPRESSORS . . . complete self contained engine driven units with capacities of twenty and thirty-five feet of actual air, available in a variety of mountings and assemblies.



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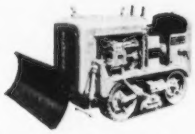

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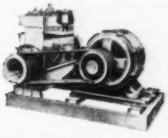

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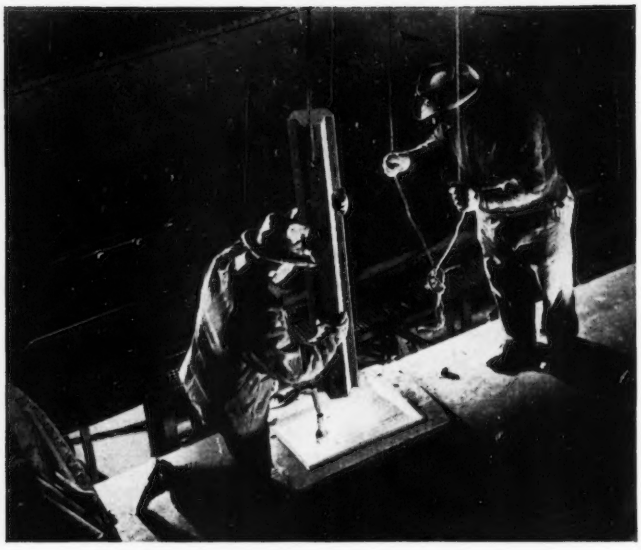

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LORAIN ROLLED PLATE LININGS AND GRINDING BALLS

UNITED STATES STEEL

Utah *(Continued)*

closely watching the situation in the Tri-State Field, where **Eagle-Picher** miners have reportedly signed contracts calling for pay cuts but directly linked to the possibility of a price rise in lead. Such contracts, under which pay scales might rise gradually along with a metals price rise, may interest PMC members in the closed Utah mines.

At the present writing, the Utah situation is this:

Pacific Bridge Co. at Park City suspended its lead-zinc tailing operations May 6. There seems little chance of reopening.

On May 6 **Park City mines** cut back from a 48 to 40 hour week.

On June 1 **Kennecott** cut to a 40 hour week at its big Bingham open pit. There seems hope for an ironing out of Kennecott's labor difficulties at Bingham. The International Brotherhood of Electrical Workers renewed their 1948 contract without significant change on August 2.

One June 1 **American Smelting and Refining** cut to a 40 hour week at its Murray and Garfield plants.

All major **Park City mines** closed in late June and early July, idling an estimated 800 men.

Park Utah closed June 27, Silver King and New Park shut June 30.

North Lily Mining Co. at Eureka closed July 1.

Brightest side of the Utah picture is the fact that Kennecott's operations have continued, maintaining the industry's largest payroll in the state. A S & R is likewise operating its major units, as is **International Smelting & Refining** at Tooele. However, an unexpected decline in copper prices, coupled with the previous price cuts of early spring which have only been partially recovered, would deal metal mining in Utah an extremely severe blow.

WASHINGTON — Permanente Metals buys WAA plants. Work begins on new M & C mine.

★**Crater Mining Co.** reports its tunnel in more than 100 ft. at Comstock Mountain, northeast of Colville. First shipment of ore was made to the smelter at Trail this summer. The 21.3 tons assayed 21.1% lead, 1 oz. silver and 0.8% zinc, and netted the company $682.16. Bulldozing and blasting for an exploratory tunnel uncovered most of this ore.

★**Permanente Metals Corp.** has purchased the Mead reduction plant, the Trentwood aluminum rolling mill and a bauxite plant at Baton Rouge, La., from the War Assets Administration for $36 million. The company has been leasing and operating all three

plants for more than three years with options to purchase.

★With the steel strike averted, **Pacific Northwest Alloys, Inc.**, a subsidiary of **Chromium Mining & Smelting Co.**, is continuing its expansion program. Two furnaces operating use 13,000 kw. to produce from 650 to 1,600 tons of ferrochrome and ferrosilicon alloys per month. Negotiations are under way with Bonneville Power Administration to obtain more power for the reconditioned third furnace. Plans call for rehabilitation of a fourth furnace soon.

★About a dozen prospectors are looking for uranium in the area north of Chewela. The search was touched off by prospector Earl Cannon who discovered uranium on the southern slope of Kalispel Range. Although the AEC reported the ore quality to be too low to be of commercial value, there is apparently a belief that there is better ore in the area.

★**Gold Bond Mining Co.**, operating in the Cascades, has added the following claims and fractions to its holdings: Gold Quartz, Gold Quartz Extensions No. 1 and No. 2, Lucky Fraction No. 1 and No. 2, Grace, and Rosalind. The company now has 24 claims and fractions over an area of 400 acres.

Frank Lilly, president, reported current activities are confined to the Pole Pick mine, but plans are being made to reopen the Olympia tunnel and for a tunnel to cut the wide Gold Quartz vein in the Wilder mine from the Negro Creek side.

★An electrical dust precipitator will be installed in **Northwest Magnesite's plant** in Stevens County. A similar unit installed ten years previous burned out during the war and could not be replaced.

★A double compartment shaft has been sunk about 60 ft. in the **M & C mine**, discovered a few months ago by E. J. Mullen, six miles east of Chewelah. Drifting both east and west is to start soon. A permit has come to ship a limited tonnage to the Bunker Hill smelter, and 14 tons of run-of-mine ore will be shipped to determine revenue to be expected from the property.

★**Howe Sound Mining Co.** earned 55c a share for the second quarter ending June 30, compared to $1.23 a year ago. The company has developed air-operated gates for handling large amounts of coarse muck. Standard chutes at Holden mine in Chelan district have been equipped with the new gates.

★A unanimous vote by striking miners of Metaline Falls authorized their union leaders to sign non-Communist affidavits.

★Approximately $10,000 was stolen from **Howe Sound Mining Co.'s** safe at Holden in the early part of August. Sheriff's officers, flown into the mine have recovered all but $2,000 of the loot.

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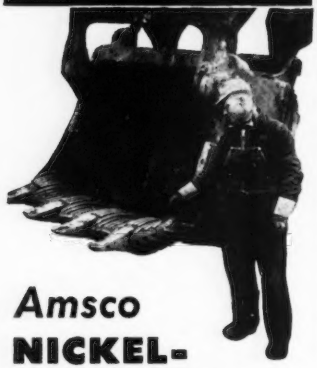

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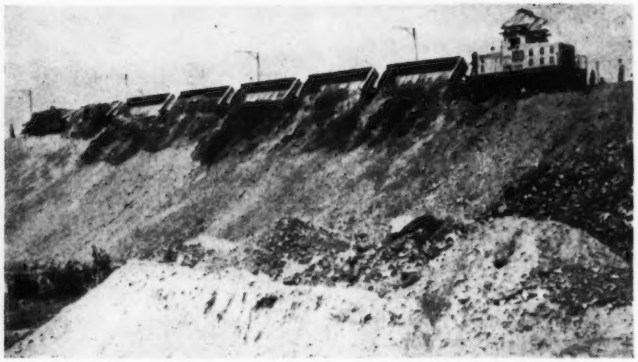

ELECTRIFICATION is widespread in the mines of the Belgian Congo. Waste from the Ruwe copper mine is dumped. The Ruwe is one of the western mines.

CANADA—Development work is widespread. — B. C. reports production figures.

ONTARIO

★Depth development at **Little Long Lac Gold Mines** has brought discouraging results, as reported by W. Samuel, president and general manager. At the end of this year the deep work will be discontinued unless some new concentration of values can be found. Ore reserves at the end of 1948 amounted to 382,651 tons averaging $12.22 per ton, a supply good for more than two years. Development has been completed on the main vein down to the 26 level at 3,800 ft., where exploratory drill holes are being put down another 700 ft. On the upper levels good grade ore has been mined for lengths up to 1,500 ft. At depth the grade has diminished to $4 across 3-ft. widths, although a 400-ft. length at the west end of the vein on the lower levels is reported to grade $11.42 over 3.5 ft. Two newly acquired claims to the southwest are being tested by drilling. A. E. Case is mine manager.

★John E. Hammell, president of **Pickle Crow Gold Mines**, stated that production in the first five months this year was 9.5% higher than in the same period of 1948. The mill has been averaging 355 tons daily, the rated capacity being 480 tons. A. G. Hattie, director of mining, reports a drop in grade last year to $15.19 from the 1947 average of $15.55 per ton, and to $13.40 in the first four months this year. Ore reserves have been maintained by vigorous exploration, equal to capacity output for four years. The No. 2 vein, main ore source, has been developed down to 1,225 ft. The Howell vein has been developed to the 2,450-ft. level. Plans are being considered for exploring the adjoining Albany River property and developing the No. 5 vein, which was discovered in 1947 on the 1,350-ft. level.

★The mill rate at **Cochenour Willans Gold Mines**, adjoining the McKenzie Red Lake mine, is to be increased from 211 to 300 tons a day, according to a statement by W. M. Cochenour, president. Further increases up to 500 tons will be made as the mine develops. W. P. Mackle, mine manager, has announced that new equipment for enlarging the mill is to be installed before the end of August. The success of the Fluo-Solid roasting plant, erected to treat flotation concentrates formerly shipped to Tacoma, has been brought to the stage of satisfactory operation since it was installed in 1947. Grade to the end of March was $17.26 per ton for ore produced from the No. 2 shaft, which has been connected on four levels with the No. 1 shaft. A long life for the mine has been indicated by exploratory work.

★**Upper Canada Gold Mines**, located about midway between Kirkland Lake and Larder Lake camps, is engaged in opening four new levels below 1,250 ft. at the No. 2 shaft. Some improvement in grade compared with the 1,000-ft. level has been found. Workings at both the No. 1 and No. 2 shafts have ore reserves good for five years, but an active drilling campaign is in progress to test the recently purchased Brock and Eastward claims. R. R. Brown, president, reports that promising ore sections have been located by diamond drilling in an area 3,500 ft. east of the No. 2 shaft on the former Eastward property and plans for shaft sinking there are being considered.

★**Starratt Olsen Gold Mines**, adjoining west of the Madsen Red Lake mine, went into production last September with the 500-ton mill formerly used at the Uchi mine. Recovery in 1948 averaged $4.43 per ton compared to $8.39 reported for the first five months this year. Labor shortages have delayed operations so that mill-

ing has not yet exceeded 350 tons daily. It is expected to have the mill running at capacity after the 1,000-ft. level has been made ready for mining. Ore reserves were last given as 455,-430 tons averaging $6.37 per ton cut grade. R. J. Kilgour is mine manager.

★June was the best month to date for the **Hasaga Gold Mines**, in the Red Lake district. Output was estimated at $80,000 after milling had been stepped up to 434 tons daily compared with 367 tons in 1948. Operating costs continue to be reduced, amounting to $3.96 per ton for the first four months this year as against $5.02 in 1948 and $7.63 in 1947. The president, John E. Hammell, reports that cost aid last allowed the company just under $42 per oz. for its gold. Promising areas are being tested for new ore, particularly to the west on the 2,200-ft. level. C. A. Sheehan is mine manager.

QUEBEC

★A. G. Ballachey, mine manager of **Quemont Mining Corp.**, located north of the Noranda mine, reports half of the millfeed to be coming from the surface stockpile. This is to be used before the freeze-up. Stopes have been prepared on four levels to a depth of 560 ft. on the west orebody, which is supplying the balance of the ore required. Stopes are reported to be good for 2,500 tons daily, although maximum requirements are close to 2,000 tons. Production started June 20 and before the end of July the daily rate had advanced to 1,800 tons; by the middle of August the cyanide mill was expected to be treating tailings from the flotation circuit. Shaft sinking has been completed to 2,600 ft. J. H. C. Waite is president and J. C. Nicholls is consulting engineer.

★Underground development and surface drilling are in progress on the Duprat Township property of **Quesabe Mines**, 10 miles west of Noranda. A gold-bearing quartz lens has been intersected by drifting on two levels. Consideration is being given to installing an electric mining plant, replacing the present diesel equipment, and deepening the shaft from 635 to 1,050 ft. The company is also discussing plans for buying the mill in northern Ontario belonging to the **Berens River Mines**. Underground work is being concentrated on stoping ore for stockpiling on surface. C. W. Croskery is president and mine manager.

★At **Waite Amulet Mines** sinking has been started for the new No. 3 shaft, as reported by J. Y. Murdoch, president. The shaft is to reach a depth of 1,700 ft. to explore the area where new copper-zinc ore was discovered last January in diamond drilling. The new work will cost an estimated $600,-000. The concentrator is treating about 10% more ore than in 1948, averaging about 1,350 tons daily. Mining is being continued at the "C" and "F" orebodies, the latter to be exhausted by the end of this year. Ex-

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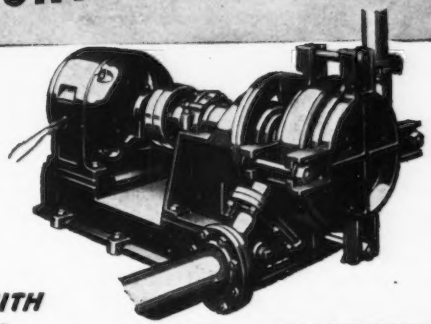

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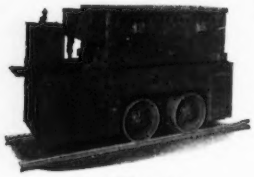

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Quebec *(Continued)*

ploratory surface drilling is being continued beyond the area of the new orebody. T. E. Little is manager.

★A drive is being put out south from the Noranda mine on the 6,000-ft. level to explore the property of **Osisko Lake Mines**, controlled by **Ventures Limited**. The Osisko boundary is 1,100 ft. from Noranda workings. Geological evidence indicates the best ore chances to be along the andesite-rhyolite contact, below 4,000 ft. The northwest portion of the property will be tested by diamond drilling, both underground and on surface. Both electrical and gravimetric surveys have been made. W. B. Maxwell is president.

★R. R. Basserman, manager of Barnat Mines, adjoining Sladen Malartic on the west, states that encouraging results have been secured from development and exploration on three levels. The area being tested is the north zone in the National section of the property, made accessible by extending three levels from the Sladen mine. Lateral work has confirmed several good ore intersections from drill holes. Plans are now being made for deepening the National shaft from 755 ft. to 1,250 ft.

★**Elder Mines** has been shipping flux ore to Noranda at the monthly rate of 8,000 tons, which was to be increased in August by 50%. Noranda has been receiving from both the East Sullivan and Quemont mines a steadily mounting tonnage of concentrates, which requires the extra shipments of flux. Gold content of the Elder flux has been averaging $5.14 per ton since the end of April, up from the $4.20 average last year, when mining was limited to depths above 600 ft. Deepening the shaft to 1,260 ft. has led to developing three new levels, where stopes are now being opened. At the lower horizons the silica content has increased to 78%. A. H. Honsberger is mine manager.

★The phosphate property of **Quebec Smelting and Refining, Ltd.**, at Buckingham, is to be equipped with a 25-ton pilot mill, as reported by the president, R. P. Mills. A series of 26 diamond drill holes showed the rock to average 35% phosphate. After 1 million tons have been indicated by the exploration program it is planned to increase production to 1,000 tons daily to recover more than 300 tons of phosphate. Mining is by adit, and stopes are now being prepared. Use of a new type of concentrator is being considered, the tailings to be treated by flotation. Estimated output will provide about one third of Canada's requirements for phosphates, of which approximately 300,000 tons annually are imported from the United States. Dr. J. H. Morgan is consulting engineer.

★The Chibougamau properties of **O'Leary Malartic Mines**, located in

McKenzie Township within two miles of the Gilman Lake terminus of the new highway, have had two discoveries, as reported by J. R. Kyle, director in charge of prospecting. A find was made last fall on the north side of Bearigan Lake disclosing gold values up to $13 per ton and a zinc content averaging better than 3%. Later work has extended the shear zone to the east and additional trenching is being done. About 1,200 ft. north of the first find a second and probably more important discovery has been made. Three trenches over a 350-ft. length have exposed a well mineralized 20-ft. shear zone. Chip samples across widths of 5 to 15 ft. disclosed maximum values of $13.30 per ton in gold, 7.7 oz. silver, 18.48% zinc, and 13.4% lead. Prospecting is being continued to prepare the ground for systematic sampling.

MANITOBA

★**International Nickel Co.** has optioned the Johnson group of claims at **Mystery Lake**, about 20 miles north of Pikwitonet Station. Original reports in June indicated massive sulphides carrying as high as 3% nickel. Recent sampling is reported to show an over-all average of about 0.9% for the exposed 70x350-ft. area. The company will probably start a geological survey and carry out diamond drilling from the ice this coming winter. In addition to the Johnson group, INCO has 70 claims staked in the vicinity.

★**Sherritt Gordon Mines Ltd.** reports that flat drilling at Lynn Lake from the 1,000-ft. level on the "A" orebody cut 153.7 ft. carrying 1.59% nickel and 0.6% copper. The orebody apparently occupies a 300 x 200-ft. area to the northwest. Two drill holes are now being put out south and east.

Ore conditions on the 1,000-ft. level are better than indicated through surface drilling. The first day, the pilot mill produced a concentrate from the drift ore, running 17% nickel.

The north drift on the 1,000-ft. level will continue through the "A" orebody and should reach the "C" at an early date. A crosscut east will be started for diamond drilling below the 1,000-ft. level.

★**Ogama-Rockland Gold Mines Ltd.** milled 12,817 tons in the second quarter for $151,989, an average recovery of $11.86 per ton. This compares with $152,672 from 12,142 tons during the first quarter.

Development work continues on the 250, 375 and 500-ft. levels on the Ogama vein. Diamond drilling is proceeding on the 750-ft. level to explore the downward extension of this vein.

Since Jan. 1, $100,000 has been repaid to **Gunnar Gold Mines Ltd.** on a loan of $500,000.

BRITISH COLUMBIA

★Final figures on British Columbia mineral production for 1948, issued

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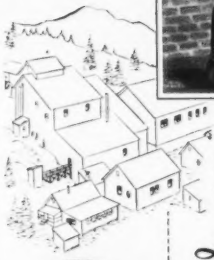

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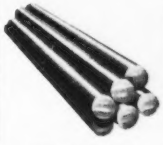

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British Columbia *(Continued)*

with the provincial mines department's annual report, show the output at an all-time high in dollar value of $152,524,752, representing an increase of $39,000,000, or more than 35%, over 1947. The total doubled the 1946 figure.

There was an increase of 8.7% in lead output by weight to 332,996,351 lbs.; and a 10.3% jump in zinc to 296,012,941 lbs., with the dollar value upping from $41,884,977 to $60,072,542 for lead and from $30,147,939 to $41,234,603 for zinc.

In gold, lode showed a jump of 17.6% to $10,018,050 for 286,230 fine oz., and placer a 191.7% gain to $585,200 for 20,332 oz. Copper output increased 3% to 43,025,389 lbs., with value up 12.9% at $9,616,174. Silver was up 17.7% to 6,718,122 oz. with value up 22.6% at $5,038,592.

Mines Minister R. C. MacDonald's report noted that average value of mining output in B.C. for the last 25 years is $60,525,000, and that quantity production in 1948 of the principal metals was considerably greater than in recent years when they had been curbed by war conditions and strikes. The average number of persons employed in the industry is placed at 16,397, with salaries and wages totaling $38,813,486. The industry paid $16,974,914 in federal taxes and $5,141,148 in provincial taxes. It also set aside $1,530,238 for workmen's compensation, silicosis, unemployment insurance and similar levies. At the same time all companies paid out a total of $37,672,319 in dividends, an all-time high, and an increase of $10,000,000 over the previous record in 1947. Dividend distribution was as follows: Bralorne, $124,700; Britannia, $271,000; Consolidated, $36,035,160; Crows Nest Pass Coal Co., $186,354; Granby Consolidated, $450,231; Highland Bell, $125,268; Iceland Mountain, $73,550; Sheep Creek, $150,000, and others, $256,056.

★Three uranium possibilities have been acquired by **Pacific Uranium Syndicate** in widely separated districts. Two properties have definitely established radioactivity; the third adjoins a property on which uranium occurrences have been found, with active exploration under way. The syndicate has also optioned claims from Consolidated Mining & Smelting comprising the Molly property on which there was radioactivity. An established content of molybdenum is regarded as a worthwhile asset in view of the assured UK market at 54 cents per lb. In the Hazelton area, the Syndicate has an option on four claims which adjoin the property on which uranium showings are under development by **Western Uranium-Cobalt Mines, Ltd.**

★Shareholders of **Winslow Mines** have approved a plan to consolidate that company with other properties obtained by associates operating as private syndicates into a new company, **Sunshine Lardeau Mines, Ltd.** As one phase of this plan Winslow already is operating the Spider Mine in the Slocan-Lardeau area, with resumption of production under management of Walter J. Scorgie. Action was taken by Winslow company because of poor conditions for gold mining. Winslow, based largely on gold properties, is seeking new activity in base metal and silver mines. It is planned to move the Winslow machinery to the Spider property and concentrate lower grade for profitable shipping. Mr. Scorgie reports ample Spider ore to maintain continuous operation of a 50-ton mill. High grade ore blocked out by tunnels on No. 1 vein consistently give assays in channels samples cut across the high-grade portion of the vein from widths of from 2 to 3 feet, of $100 per ton. Best values are in silver and lead, with zinc, gold and cadmium following in that order. The mine has been equipped for breaking high grade ore and shipping it to Trail smelter.

★Fourth increase in the Canadian price of lead since the 11.75 cent low was announced by **Consolidated Mining & Smelting Co. of Canada,** operating at Trail. An advance of .25 cents brings the lead price delivered to Toronto or Montreal to 14.5 cents. Zinc prices at Trail have been boosted to 10.25 cents, rising in 2 half-cent boosts from 9.25 cents.

★Custom ore shipments to **Consolidated Mining & Smelting Co. of Canada,** Ltd.'s Trail smelter in the four-week period ending July 16 totaled 12,631 tons, with 6,776 tons lead and 5,855 tons zinc. This compared with the previous four-week total of 9,618 tons, including 3,795 tons lead and 5,823 tons lead.

★**Island Mountain Mines Co., Ltd.,** reports production for June as 3,642 tons milled, producing 1,314.48 fine oz. gold.

★**Silbak-Premier** gold mine, near Stewart, in the Portland Canal district, is reopening after a year's shutdown caused by a labor dispute. Dale L. Pitt, managing director, said return to normal production would take at least two months.

Settlement of the dispute was made July 23, with the International Union of Mine, Mill and Smelter Workers foregoing all claims of retroactive pay increases, the main issue. Other points in the agreement: Workers will return to their jobs at the same rates of pay in force at the time of the closure; all employees on the payroll at closure will be rehired without discrimination; after a reasonable period of operation with the mine's re-employed crew, a new labor agreement will be negotiated. A preliminary crew has returned to the mine for rehabilitation procedure.

The mine has about 60,000 tons of proven ore reserves of which a large proportion is broken ore. International Union of Mine, Mill and Smelter Workers remains official bargain-

ing agent for the mine, the Labor Relations Board having rejected a company application to have the union decertified so work could resume with a clean slate and the men given an opportunity to choose their own agent.

★**Privateer Mine, Ltd.**, directors have ordered an immediate development program on the optioned Woodbury Creek property near from Ainsworth on Kootenay Lake. The program will consist of driving on the ore and making shipments either to a nearby mill or Trail Smelter. Ore in the new discovery is silver-lead zinc of high milling grade, with lead values predominating. Privateer improved its cash position by $69,089 in 1948, and a further $12,000 to $15,000 may be forthcoming under the emergency gold bonus plan. Mr. Tait said production would not be resumed at the Privateer Zeballos mine until conditions for gold mining warranted a $75,000 development program. Operating at two-thirds of capacity for 10 months of 1948, Privateer mine realized an operating profit of $62,350, and a net loss of $107,935 after write-offs. Meanwhile, Privateer Mine, Ltd. is considering financing Tofino Gold Mine property to production and negotiations are proceeding with operating companies who may place the mine in production early next year.

★Value of ore sold in the last quarter of 1948 from **Santiago Mine's** Bosun property at New Denver was $56,881, according to R. Crowe Swords, president. Smelter receipts were 42,436 tons.

★**Reeves MacDonald's** new 1,000-ton mill in Slocan area is now in production with the output from the first 500-ton unit. Second ball mill, to be installed in late summer, will bring the operation to capacity. An estimated 2,500,000 to 3,000,000 tons of ore have been blocked out. **Pend Oreille Mines** holds 60% of the capital stock of Reeves MacDonald.

★**Sheep Creek Gold Mines, Ltd.**, issuing its July 15 dividend of 2 cents per share, announced net earnings of the company's Zincton and Sheep Creek mines in the three months ended May 31, 1949, were 6.87 cents per share. Zincton produced 26,074 tons of ore containing 3,444,427 lb. of zinc; 102,193 lb. lead; 20,345 lb. cadmium; and 10,826 oz. silver for a net smelter value of $282,887. After operating expenses and writeoffs net profit for the quarter was $112,348. Increased lead production has now been made possible at the Zincton mine by completion of a raise from No. 3 to No. 1 level in an upper working where lead values predominate. Stoping is under way on a fair grade of lead ore adjacent to the raise. The company expected to place the Paradise mine in Windermere area on production in August. The 50,000 tons of indicated ore at the Paradise carry about 7% lead, 10% zinc, and 6 oz. silver per ton. Tonnage rate at the Vanada mine on Texada Island, in

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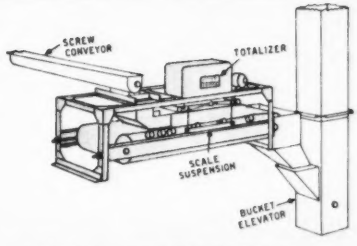

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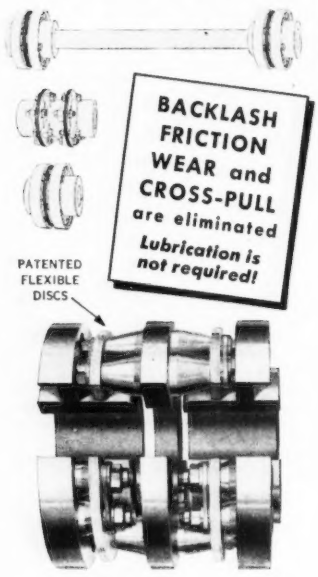

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British Columbia *(Continued)*

which Sheep Creek owns one-third interest, has been brought above 150 tons.

★Jersey lead-zinc (Emerald) mine of **Canadian Exploration, Ltd.**, at Salmo, wholly owned subsidiary of **Placer Development, Ltd.**, handled 11,792 tons averaging 2.4% lead and 5.2% zinc during June, and produced 1,400 tons of concentrates which, at the average price of metals for the month, is estimated to yield $90,000. This compared with 9,600 tons handled in May, valued at about $127,000. Lead-zinc production was initiated on the Emerald property early in March, following discovery and rapid development last year on the property of a good grade, flat-lying lead-zinc orebody capacity of low-cost mining. The company's former tungsten operation was suspended in late December, and the mill changed over for treatment of lead-zinc ore. Concentrates are shipped to Trail smelter.

★**Silver Standard Mines, Ltd.**, New Hazelton, reported a net loss of $26,762 and an operating profit of $4,791 for the first six months of production ending March 31, but added a better showing is resulting from decidedly improved grade of ore, with about $7,000 operating profit in June.

Indicated ore reserves have increased to three years' milling requirements on the basis of present output of 58 tons daily. Besides lead and zinc, Silver Standard has major values in silver, gold and cadmium. Outlining development, Ridgeway W. Wilson, managing director, says that in 520 ft. of drifting on No. 4 vein on the 1,500 level, 435 ft. of ore length was disclosed, with ore continuing in the north face. On the 1,300 level, 492 ft. of ore was obtained from 610 ft. of drifting. Ore occurrence has been shown through a vertical distance of 350 ft. Future program will consist in extending known ore faces on both No. 1 and No. 4 veins and the extension of 1,300 crosscut to cut No. 5, 6 and 7 veins. These latter three are known to contain above average grade ore.

★Systematic underground development by **Utica Mines (1937), Ltd.**, of its Slocan property, former producer of high grade silver-lead-zinc ore, is again becoming profitable. Objective is shipping high grade ore, plus development of substantial tonnage of milling grade. High grade is now going regularly to Trail. Developed ore shoot on the east vein is 125 ft. long and averages 181 oz. silver, 15.8% lead and 21.8% zinc for an average width of 6 to 8 in., with ore running better than $200 per ton. West vein parallels the east vein at a distance of 60 ft. and was reached by crosscut on the 5th level. At present a drift on the level and a raise at a 45-deg. angle are both in ore running better than $100 per ton for an average width of 24 in. As similar ore was mined from No. 4 level years ago, the two new faces are blocking out ore on three sides.

★**Torbrit Silver Mines** reports recovery on its 300-ton mill at Alice Arm has not been up to expectations, but that plant scale tests indicate addition of flotation to the circuit will raise silver recovery to between 88 and 90%, and also recover a small amount of lead. Ore grade has been up to expectations. The company adds that a limited amount of exploration has shown the favorable zone for ore deposition to be wider than indicated by earlier work.

★**Taku River Gold Mines**, in Atlin district of northern B.C., expects to have its new roaster in place before freeze-up. J. D. Mason, mining engineer, has been to Cuba to arrange for dismantling and shipment of the unit, which is expected at Tacoma during the late summer.

★**Conwest Exploration Co., Ltd.**, is continuing surface work on the property in Cominco's Sullivan mine at Kimberley. Conwest, which has controling interest in United Keno Hill mines, silver-lead property in the Yukon, is continuing the busy exploration pace it maintained last year when it went into the Kimberley area.

★**Mines Operating, Inc.**, Seattle, Wash., has commenced hydraulic operations on nine placer leases on Guyet Creek, a tributary of Antler Creek in the Cariboo district. In preliminary work done in 1948, sluicing of 500 cu. yd. yielded returns of 86 cents per cu. yd.

★**Yale Lead and Zinc Mines., Ltd.**, has completed the preliminary program of preparing underground workings at its Ainsworth properties for a resumption of operations. Work is now concentrated on diamond drilling with some 25,000 ft. planned, to determine the downward extension of the Highlander vein and to investigate the Krao property. The Highlander adit has been opened and reconditioned and the drift north and south on the vein has exposed over 500 ft. of milling grade lead and zinc ore. The Highlander drifting may be continued or other adits from former workings reconditioned and opened up, depending upon which will be the most convenient to reach other vein systems on the property. Company backers have provided another $70,000 for continuing investigations of the 5-mi. Ainsworth holding along Kootenay Lake and for initiating diamond drilling at the company's gold property at Portland Canal known as Redcliff.

★Whitewater operation of Retallack Mines, Ltd., approached the borderline between profit and loss at mid-summer due to fall in base metal prices. Maintenance of prices at the first of the year level and production at the 300 tons daily capacity would have meant a profit of between $15,000 and $20,000 monthly. Customs shippers to Whitewater were declining in number and those remaining were asking lower

treatment rates. Although the operation continued to make a small profit, Vere McDowall, manager, said the company would have little choice but to suspend if the situation continued to deteriorate. Meanwhile, Retallack is considering reopening the Whitewater mine to add 50 tons daily of mine ore to the material being treated from the dumps.

★**Granby Consolidated Mining & Smelting Co., Ltd.,** reports net income of $138,838 for the quarter ended June 30, 1949, against $569,551 for the like period of last year. Drop in copper prices is blamed for the major part of the 1949 decrease. During the second quarter ore milled totaled 440,497 tons, compared with 454,639 tons milled during the first quarter of this year. Copper output for the second quarter totaled 9,374,842 lb. against 10,161,164 lb. in the first quarter.

Yuba Consolidated Gold Fields of San Francisco has two B.C. sites on which major operations are planned in 1950 if tests this season are in line with expectations. Major Glenville A. Collins has turned over the Yuba rights on Slate Creek, Omineca, which he acquired last season from **Consolidated Mining & Smelting Co. of Canada,** together with adjoining ground. Test drilling by Yuba is under way. North American Goldfields, headed by Collins, has leased 12 of its 17 mi. of leases on Quesnel River to Yuba subject to royalty. If tests about to start confirm values, a $500,000 bucket-line dredge is proposed for this property.

★An in-plant health service, designed eventually to give consultation service for indispositions other than first aid for injuries, is being developed at Trail operations of **Consolidated Mining & Smelting Co. of Canada, Ltd.** Prevention is the keynote of the new project.

★**Western Exploration Co., Ltd.,** Silverton, silver-lead-zinc producer, is operating its mill on a basis sufficient only to look after ore taken out in development work, but tells of favorable results underground in the Enterprise and Standard Mines, and reports an ore objective is expected to be reached in the Mammoth mine soon. In the Enterprise, opening of No. 8 level has shown the vein a little wider than in the upper sections of the mine, while in the Standard good ore has been opened. At the Mammoth a raise from the 9th to the 7th level will be started shortly which should cut the Mammoth vein a short distance above the 9th.

BRAZIL

★The Ministry of Agriculture has announced that deposits of limestone, clay and similar substances, in the Guapira region, municipality of Capão Bonito, state of São Paulo, are open to development by private firms.

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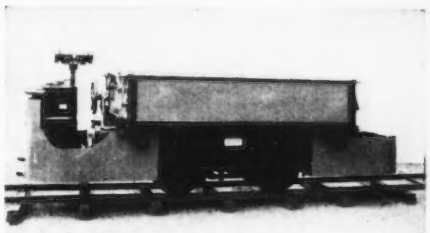

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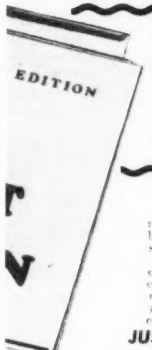

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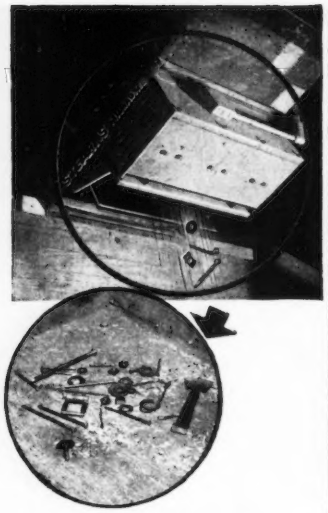

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Brazil *(Continued)*

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MEXICO

★Mexican mining depending upon private companies for electric power have been benefited by the Ministry of National Economy. Lic. Antonio Martinez Baez, Secretary, has advised these companies that it is illegal to collect in dollars for services rendered or sales made in Mexico, and they must therefore accept pesos in payment. The action was prompted by the complaint of the cooperative society running the Dos Carlos mines, Pachuca, Hidalgo, which found it ruinous to pay for its electric power in dollars. The cooperative told the Ministry that on that basis, electric power took 52% of its gross earnings. When the dollar-peso rate was 4.85, its electricity bill was an average of 90,000 pesos monthly. Now that the rate has soared to 8.65, the bill is 185,000 pesos, but without any increased power or service.

★Resuming the gold monetary standard would not be a permanent solution of Mexico's weakening peso problem, according to Augustin Guzman V, after an interview with President Miguel Aleman at which he discussed mining and other industrial matters. "Our money can only really recover on the fruits or work and production," Guzman said. "Any other attempt to strengthen the peso would have but passing benefit. To aid our money with a loan would be just the same as mortgaging our riches which Mexico alone must exploit."

Mexico adopted the silver monetary standard in 1931. Since then gold coin has been out of circulation and has been regarded legally as merchandise. The gold peso in Mexico is now worth more than a dollar—8.85 to 9.25 silver pesos, whereas the dollar is pegged at 8.65 pesos.

★Mining exporters have had the 10-day term the Ministry of Finance, Lic. Ramon Beteta, Secretary, allowed them to declare shipments and pay the 15% extra ad valorem tax on consignments extended to 40 days. The term was too short.

★Announcing that the miners' union hails the "Workers' Rights" convention just held in Mexico City a success because it defended labor's interests, Felix Ramirez, the union's new secretary-general, said,

"Our members are gratified that the Mexican Government withdrew its petition for an American oil loan because Mexico, right now, doesn't need any U. S. loan. Decreasing oil prices resulting from over-production make it evident that Mexico should not allow her reserves to fall into the hands of imperialistic companies."

Mining and associated workers, who number about 100,000, are pledged to do their utmost to help the Mexican oil industry, Ramirez added.

The union urges the Government to exploit either itself or by special facilities to private interests uranium deposits in Chihuahua and Oaxaca as well as gold, silver, zinc, iron and mercury tracts in Guerrero. More and better roads facilitate working the Guerrero deposits, the union said.

★Improved copper prices are a help but not the salvation for Mexican mining which continues to struggle under high taxes and rail freight rates, said Ing. Gustavo P. Serrano, president of the Mexican Mining Chamber. Ing. Serrano is none too cheerful about the immediate future of mining. Unless there is tax and freight rates relief immediately, many more mines will close between now and end of 1949, he predicted.

★Ing. Luis Espinosa de Leon, head of the ore-testing department of the Ministry of National Economy's metallurgical laboratory at Tecamachalco, D. F. won the U. S. Government scholarship for advanced training by the U. S. Bureau of Mines at Salt Lake City, Utah, announced the American Embassy in Mexico City. While in the U. S., he will be maintained by the Mexican Government. Ing. Espinosa de Leon will resume his service with the National Commission for Stimulating the Mining Industry, which functions under the Ministry, when he returns to Mexico.

★Refined and semi-refined gold can only be exported from Mexico under special permit of the Bank of Mexico, Lic. Carlos Novoa, Director General, the Ministry of Finance, Lic. Ramon Beteta, Secretary, has ruled.

★Ing. Genaro Gonzales Reyna, prominent Mexican mining engineer, has reported to the Ministry of National Economy discovery of a great sulphur deposit on the Isthmus of Tehuantepec, Vera Cruz and Oaxaca. He said most of this sulphur is in saline domes, not difficult to extract and readily shipable to home and export markets because it is near the Tehuantepec Railway, terminals of which are Coatzcoalcos, on the Gulf Coast, and Salina Cruz, on the Pacific seaboard. The railroad is part of the National Railways system. Working this deposit would afford Mexico all the 100,000 tons of 99.5% pure sulphur she needs yearly for her expanding industrialization, the report said. Ministry figures show that of the 3,000 tons of sulphur Mexico produces annually, impurities make most of it unfit for many uses. Ing. Gonzalez Reyna recommended that the Tehuantepec deposit be worked by Frasch system wells and that the first extraction plants be at least 200,000-ton capacity. Mexico must import some 10,000 tons of sulphur yearly to meet present demands.

★Sierra Madre Mining Co. of Spo-

kane has been incorporated by A. W. Mackey and M. L. Wickham, to mine gold-silver ore from a mine 45 miles northeast of Mazatlan, Mexico. According to Mr. Mackay, a vein exposed for more than a mile and a half has 2000 tons of ore averaging $35 per ton ready for milling. A 35 ton mill under construction is expected to be ready in October, and installation of a smelting pot is planned.

CHILE—New bill would provide copper bonus. Several strikes settled.

★Unions and management at **Braden Copper Co.** have agreed to a five-day work week with six days' pay to keep 1,000 men from being thrown out of work.

★Because of the 30% reduction in **Chile Exploration Co.'s** output, 129 men were laid off at the Tocopilla Power Plant which supplies power for mine and plant at **Chuquicamata.**

★Shipping costs of copper ore and concentrates will be reduced by a new and shorter road from the mining camp of **Cerro Blanco** to the town of Loros. Both Loros and the President Aguirre flotation mill are on the same rail spur and can ship by rail to the smelter at Paipote.

★Senator Videla Lira was elected unanimously for his sixth consecutive term as president of Chile's Mining Society. F. Benitez and A. Herrera were re-elected vice presidents.

★Workers' unions and the management of the **Andes Copper Mining Co.** settled their differences before the Secretary of Labor. The agreement, extending for one year, granted slightly longer vacations and higher pay for night shift workers.

★Congress has received a bill that will permit the Mining Bank to pay small and middle size mines a bonus up to 3c. per lb. of copper produced as long as the price stays below 17c. (United States) per lb. Bonuses paid are not to exceed 30 million pesos (about $1 million).

Although the bill will certainly help the small copper miner along until the end of the year, it is not considered a real solution to the industry's economic difficulties which arise from steadily increasing costs due to inflation. The solution offered by the Mining Society is to let the miner sell his dollars for what they will get in the open market, about 75 pesos, instead of forcing him to deliver them to the Exchange Commission for 41 pesos.

★After a month's strike, the men at **Grace and Co.'s Romeral manganese mine** in Coquimbo Province, went back to work when an agreement was reached with the owners before the Under Secretary of Labor.

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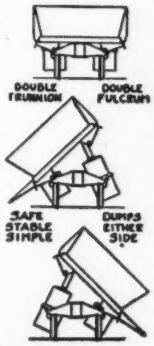

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PATIO PROCESS, a primitive method of recovering silver from ore is still being used to some extent in Mexico and South America. Dry ore is moistened with water in which mercuric chloride, copper sulphate and common salt have been dissolved. Ore pulp is then covered with mercury and ground ore stirred for an hour or two. Tailings are then washed away with water and silver recovered by retorting the amalgam.

Chile *(Continued)*

★**Cia. Minera Punitaqui** had a net profit of nearly 16 million pesos from the production of 11,400 oz. of fine gold in 1948. Because of the greater price for gold within the country, Punitaqui is building a 300-ton mill to cyanide all its ore instead of floating it and cyaniding the concentrate.

★Severity of the winter required the evacuation of more than 50 miners by plane from the **Aysen zinc and lead mines** near Lago Buenos Aires.

★Some of the workers discharged from **Chuquicamata's** operating crews at mine and plant have been hired by **Foley Bros.** who are building a new flotation mill and smelter for **Chile Exploration Co.**

PERU

★Large deposits of vanadium-bearing asphaltites, lying in Peru's central sierras, have been found to contain 10 gm. of uranium per ton. These asphaltites contain 1.12% vanadium and have been exploited on a very small scale by burning the asphaltite and recovering vanadium from ashes.

★**Compañia Minera Tarica** which operates a small mine in northern Peru, is installing a 50-ton mill. Ores average 10% lead and 15 oz. silver

★Small operators are steadily developing the Chiquian mining region in the department of Ancash. Although there are several prospects with high values in silver and lead, the lack of roads is a serious obstacle. **Compañia Argento Bolognesi** has recently installed a 20-ton mill.

★**The Empresa Minera Huamachuco,** operating in the department of La Libertad, inland from Trujillo, has recently installed a 150-ton flotation plant. The mine has large reserves of complex ore with values in lead, silver and zinc.

★**Sociedad Minera Puquio - Cocha** which operates one of the largest privately owned mines in Peru, in the region of Morochocha, has installed a new zinc recovery plant. The mine, **Alejandria,** is owned by Mr. Marchonelli.

★Prospecting is being carried on at a recently discovered graphite deposit, inland from Trujillo.

★The Peruvian government, by decree, has freed the mining companies from the necessity of turning over to it 45% of their dollar proceeds from export sales in return for Peruvian soles at the official exchange rate. The official exchange is 6.485 soles to the dollar against the free market rate of 19 to the dollar. That is the rate that can be used under the new decree.

Mining companies will still turn their dollar proceeds over to the government. In return they will receive certificates for 100% of the dollar value. These are dollar certificates. They can be sold in Peru for soles in the free market or they can be cashed in for dollars with which to pay for imported supplies or other dollar expenses incurred in operating. They also can be used to cover depreciation, depletion and for distributable profits.

PHILIPPINES

★Operations of **Benguet Consolidated** showed a $231,800 profit before income taxes, for the first quarter of 1949. Most of the profit resulted from chromite mining operations at **Masinloc. Balatoc** profits were $49,000. Production at the Benguet-Balatoc mill was $341,000 for June. Recovered value

per ton was $7.40 at $35 gold, an increase of 60c per ton over the Jan.-May average.

★June shipments of chromite ore from **Consolidated Mines** totaled 10,250 tons, less than half the usual monthly rate which has been averaging about 22,000 tons.

★**Lepanto Consolidated Copper** reported 15,920 tons of ore milled in June, averaging 4.55% copper and 0.192 oz. gold per ton. From this 2,087 tons of concentrate were produced assaying 32.05% copper and 1.1% gold. Work is under way to expand mill capacity from 500 to 1,000 tons per day. The mine can provide the larger tonnage as soon as the mill is ready. Cut-and-fill, shrinkage and sub-level caving are used in mining. The vein is said to be 35 meters wide.

The company employs 300 Filipino miners underground. Native supervision wherever possible has improved labor relations and saved considerable overhead. Miners' wages vary from 2.30 to 3.30 pesos per shift for contract work, plus a bonus which raises daily earnings to 3.50 to 6 pesos ($1.75 to $3.00).

★Average ore shipped to date from the **Misamia Chromite** property, has assayed 53.7% chromic oxide, with a chrome-iron ratio of 3.16 : 1. The Westinghouse Co. has contracted for the output.

★**Surigao Consolidated's** main shaft will be sunk to the 500-ft. level. Development on the 400-ft. level has disclosed a substantial orebody with better value than on the 300. Mill capacity will be increased. Gold production has been averaging about $115,000 per month.

★A proposal calling for a government subsidy for the gold mining industry was refused by the Philippine National Economic Council. However, no interference is expected from the government with sales of bullion in the open market at Manila. This in itself has the effect of a subsidy to gold producers.

AUSTRALASIA — Gold subsidy to be increased. Seek Siamese-Australian taxation accord.

WESTERN AUSTRALIA

★Prime Minister Chifley has announced that the Commonwealth subsidy paid to certain gold mines in Western Australia will be increased and also be made available to gold mines in other states. Allowance on paid-up capital will be increased from 4 to 6%. The chief criterion for allocating new subsidies will be the needs of towns dependent for their existence on gold mining.

★Member companies of the West Australian Chamber of Mines employed

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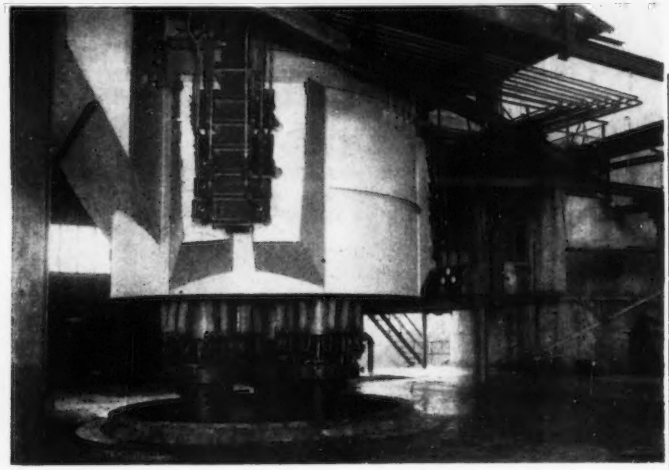

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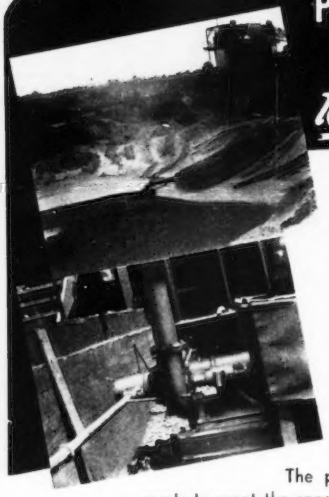

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Western Australia *(Continued)*

5,519 men at the end of 1948, compared with 6,015 a year earlier.

★Total gold production in 1948 was 662,741 oz. Following are the leading producers.

Lake View & Star Ltd.	137,500 oz.
Great Boulder Pty. Ltd.	87,457
North Kalgurli (1912) Ltd.	56,804
Big Bell Mines Ltd.	51,770
Gold Mines of Kalgoorli Ltd.	40,412
Central Norseman Gold Corp.	39,150
Boulder Perseverance Ltd.	32,324
Paringa Mining & Exploration Co. Ltd.	22,508
South Kalgurli Cons. Ltd.	19,037
Sons of Gwalia Ltd.	18,139
Kalgoorlie Enterprise Mines Ltd.	16,692
Triton Gold Mines Ltd.	15,652
Hill 50 Gold Mine N.L.	13,417
Broken Hill Pty. Co.	12,878
Wiluna Gold Mines Ltd.	11,820

Five other companies produced less than 10,000 oz. each from ore or sands.

★The state produced 49,413 oz. in April, an increase of 258 oz. over April, 1948.

NORTHERN TERRITORY

★Geologists have almost completed a survey of the "uranium field" in the Hartz Range. It is estimated to extend over an area of 5,000 sq. mi. No official announcement of the field's commercial possibilities has yet been made.

TASMANIA

★Electrolytic Zinc Co. of Australia has averaged 6,500 tons of refined zinc over recent four-week periods. Ore treatment at the company's west coast mines is running 11,000 tons every four weeks.

Following are production figures for the year ended June 29 compared with the previous year.

	This year	Previous
Risdon Works (zinc)	82,669	75,396
West Coast Mines:		
Ore	126,870	125,226
Lead concentrate	8,767	9,127
Zinc concentrate	38,974	37,431
Copper concentrate	3,107	3,161

NEW SOUTH WALES

★**New Broken Hill Consolidated Ltd.** realized a net profit of £305,629 in 1948 after providing £68,000 for depreciation and £237,000 for taxes. The Consolidated mill treated 103,578 tons of its own ore and 50,524 tons purchased from the Zinc Corporation. Net profit in 1947 was £116,501.

★**North Broken Hill's** production for the year ending June 30 was 329,990 tons of ore compared to 316,290 tons the previous year. This gave 61,967 tons of lead concentrate and 61,932 tons of zinc concentrate. From May 21 to June 30 the company carried out 2,025 ft. of diamond drilling.

★**Wellington Alluvials Ltd.** made a net profit of £28,672 for the year ended April 30. Working on a three-shift basis all year, the dredge operated 6,793 hours, handling 3,310,000 cu. yd.

for a recovery of 11,746 oz. M. G. Darling, company chairman, stated that operations may have to be suspended in the face of rising costs and a considerable acreage of low-grade ground ahead of the dredge.

SOUTH AUSTRALIA

★Because of a labor dispute at **Broken Hill mines,** no iron ore has been shipped for several months. Pig iron production at Whyalla has also stopped. **Rapid Bay** limestone properties have curtailed production.

VICTORIA

★Gold yield for June was 5,401 oz., 3,180 oz., less than in June, 1948. Production for the first six months of 1949 was 33,051 oz., compared with 35,155 oz. the first six months of 1948.

★Mr. Bolte, Minister of Mines, stated that government assistance to marginal mines in states other than Western Australia, will not materially improve Victoria's gold production. One or two mines may be saved from closing down but a much greater incentive would be required to stimulate gold production.

SIAM

★Directors of **Tongkah Compound No. 3 N.L.** expect to resume tin dredging in January, 1950. The company's claim for war losses is awaiting settlement in Bangkok. However, rehabilitation advances of £30,200 have been made by the Siamese government. Claim for tin ore extracted from the leases during the war has been settled separately.

★**Ronpibon Tin N.L.** produced 344 tons of ore in 11 months ended May 31. Attempts will be made to lease more areas near present operations to keep the dredge operating another five years.

Ronpibon and other Australian operators in Siam are advocating a Siamese-Australian agreement on double taxation. In addition to a royalty on tin produced, the Siamese government collects a 20% tax on dividends. What remains of the dividend for transfer to Australia is subject to Australian taxation without credit for tax already paid.

★**The Takuapa Valley** No. 1 dredge returned 17½ tons in May and 24½ tons in June, while No. 2 produced 5 and 6½ tons respectively.

INDONESIA

★Statistics issued in Batavia indicate that the Dutch "police action" against the Indonesian Republic has had no major effect on the islands' mineral production. The action began in the last days of 1948 and is now in an advanced stage of settlement and should be cleared up soon.

Production of tin ore, which

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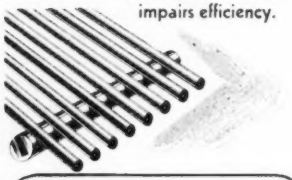

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COAL LOADING appliances are being used in Durban harbor to handle manganese which is arriving there in increasing quantities. In 1946-47 exports were 397,780 tons and 410,660 tons in the year 1948-49 ending on March 31. During last month, 26,000 tons were shipped in one week—the heaviest single weekly shipment. Most of the ore goes to the United States. Extensive repairs to coaling appliances at Durban and the existing dumper have increased the ports handling capacity to 600 tons an hour. All loading is done mechanically.

Indonesia *(Continued)*

amounted to 9,000 tons in the last quarter of 1948, dropped to 7,100 tons during the first quarter of 1949, but inasmuch as most tin-producing areas were under Dutch control before the action started, the decline cannot be ascribed directly to the political disturbance or to military activity.

This is also borne out by other mineral statistics. Bauxite production increased from 124,000 tons in the last quarter of 1948 to 181,000 tons in the first quarter of 1949, setting a new postwar record. Coal production remained practically stationary at 145,000 tons and petroleum production increased from 1,238,000 tons to 1,324,000 tons even though some of the producing areas were in the line of the Dutch advance.

NEW GUINEA

★**Bulolo Gold Dredging, Ltd.**, managed by **Placer Development Co., Ltd.**, reports production for June of 1,437,100 yards of gravel for a total recovery of approximately 7,779 oz. fine gold. Work was accomplished with eight dredges.

BURMA

★It is reported that the British-owned wolfram mines at Mawchi, 160 mi. northeast of Rangoon, have been shut down as a result of the civil war in that country, on orders from London. Mawchi is Burma's most important single source of wolfram and the producer of about 10% of world supply of this mineral. When production will be restored is uncertain.

AFRICA—Exploration continues in Orange Free State. Transvaal gold output is down.

★Northern Rhodesia's £3,500,000 mineral output in May was the highest on record. Blister and electrolytic copper accounted for £3,177,814. Other items listed were zinc, lead, manganese, cobalt alloy and vanadium pentoxide. Copper production is expected to reach 250,000 tons this year and expansion planned should increase the output to 350,000 tons by 1953.

★Mineral output in Southern Rhodesia was valued at £902,531 in May, a decrease from April's £916,673, but higher than the £734,008 in May last year.

Gold output in May was 46,616 oz. and in the January to May period this year it was 7½% higher than 1948. Asbestos production for the five months totaled 33,453 tons (value £1,660,349). This is appreciably higher than in 1948 when it was 28,922 tons.

Chrome production thus far this year is 96,698 tons compared with last year's 110,845 tons.

First exports of vermiculite to the United States were expected in August. Sabi Vermiculite Ltd. will supply about 300 tons per month.

★Responding to a British government request, the Southern Rhodesia government intends removing as soon as possible, its restrictions on prospecting for radioactive minerals. Although requisite legislation cannot be passed until the next session of parliament, prospecting for radioactive minerals is not being banned. Their export however will continue to be rigidly controlled.

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★French Equatorial Africa had its first mining conference in Brazzaville in July. Presided over by the high commissioner, it was attended by representatives of the mining industry and the geological service and other interested parties.

★Modern equipment has been installed in the Jagersfontein mine in Orange Free State, which reopened in July after 17 years of idleness. To start about 600 tons of blue ground will be mined per day with a gradual increase to 4,8 0 tons.

Previously blue ground was allowed to weather for 18 months before being washed, but in modern practice only eight hours will elapse between the time the rock is blasted from the pipe 1,000 ft. below the surface and the sorters pick out the diamonds in the strong room. Miles of conveyor belts will take the rock from the pipe to the shaft, crushers and washing plant.

★Leases signed in the Orange Free State reached four in July when leases for Free State Geduld and Freddies North and South Lease Areas were signed. Leases had been provisionally granted to enable practical development to start. Other signings are expected soon.

★Gold production for the first half of 1949 in the Transvaal was 5,738,966 oz., a decline of 82,683 oz. from the same period in 1948. Monthly outputs are increasing but costs remain high. Working costs per ton milled have ranged between 26s. 2d. and 26s. 8d. Estimated working profit per ton milled during the six months averaged 8s. 3d., compared with 8s. 6d. last year.

★Three conglomerate bands were intersected by Middle Witswatersrand (Western Areas) in its borehole M.O. 3 about 4½ miles west of Virginia on the farm Moriyah 288. At 4,904 ft. a conglomerate band assayed 4.45 dwts, over a corrected width of 92.8 in. A deflection encountered the same band at 4,911 where it assayed 3.09 dwts. over a width of 72.8 in. The same deflection contacted another band not in the original borehole, at 4,927 ft., which assayed 5.70 dwts. over a corrected width of 30.5 in.

A second band, intersected at a depth of 5,266 ft., assayed 2.4 dwts. over a corrected width of 104.3 in.

At 6,081 the drill encountered a third conglomerate band which assayed 5.3 dwts over a corrected width of 34.8 in. The borehole gave evidence of intensive faulting.

★Indications of high grade ore have been given by recent borehole results obtained by General Exploration Orange Free State Ltd. The results along with those obtained in k 1 on Kromdraai 586 and VDH on Van den Heeversrust 419, indicate the presence of upper payable reefs a few miles northwest of Odendaalsrus, and the possibility of a mine in the area.

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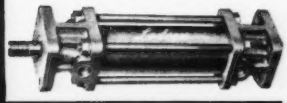

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Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

MERRICK SCALE MFG. CO. PASSAIC N. J.

Africa *(Continued)*

The company also announced that in the borehole T V2 on sub-division 1 of the farm Spes Bona 921, quartzites, pyritic stringers and conglomerate bands in the Elsburg series were contacted.

★Intersections giving up to 719 in.-dwt. were obtained by **Lydenburg Platinum Ltd.** in its borehole F R1 on the farm Ferreirasrust 163 in the Ventersburg district of the Free State. Leader reef was intersected at a borehole depth of 3,579 ft., assaying 1.08 dwt. over a corrected width of 19.31 in.

Reef intersected at 3,300 ft., assaying 16.54 dwt. over a corrected width of 43.46 in. (719 in.-dwt.) has been correlated as B reef. In a deflection of this hole, B reef was intersected at a borehole depth of 3,328 ft., assaying 9.69 dwt. over a corrected width of 48.3 in. (468 in.-dwt.)

★A deflection about half of the value of the original intersection was obtained by **President Brand Gold Mining Co.** in its borehole No. 4 on the farm Stuirmanspan 692 in the Free State. The original intersection of basal reef assayed 86.4 dwt. over a true width of 10.3 in. The deflection intersected basal reef at 6,079 ft. and assayed 90.1 dwt. over a true width of 4.93 in. Core recovery was complete, but a small, steeply dipping shear plane disturbed the regularity of the reef.

★The seventh and last non-directional deflection in the borehole ED5 on the farm Erfdeel 188, about ten miles west of Hennenman in the O.F.S., which was drilled for Free State Gold Areas, Ltd., intersected Leader Reef at 6,236 ft. 5 in. A conglomerate in this horizon assayed 2.65 dwt. over 7.5 in.

The basal reef, intersected at 6,261 ft., assayed 24.8 dwt. over 6.25 in.

Arrangements have been made for a series of directional deflections to encircle the borehole.

It will be recalled that the third deflection in this borehole gave the phenomenally high value of 56,105 in.-dwt. Other deflections gave values of between 176 and 271 in.-dwt. in basal reef.

On a farm adjoining Erfdeel, values of between 242 and 252 in.-dwt. were obtained in basal reef in the hole DNK 1 on the farm Dankbaarheid 187. Basal reef was encountered at 6,534 ft., and assayed 45.3 dwt. over a true width of 4.98 in.

★Reports from the mining houses for the quarter ended June 30 indicate what progress is being made in the Orange Free State and Far West Rand in the work to open new mines.

At **St. Helena**, in the Free State, development work is proceeding on the 2nd and 4th levels north and south of No. 3 shaft (30-deg. incline), and the total development at the end of the quarter was 4,729 ft., of which 3,265 ft. on basal reef was sampled. The payable reef disclosed was 1,395 ft. or 43% having an average assay value of 17.9 dwt. over 18 in. There were no exposures of leader reef.

No. 4 vertical shaft has been sunk beyond 2,000 ft. at which depth it passed through leader and basal reef horizons in ground broken by faulting. Fragments of reef assayed low gold values. About 215 ft. of station-work was done. Sinking was held up from May 25 to June 28 while water-bearing fissures, which had been disclosed while cutting the 7th level station, were sealed by cement.

During the suspension, two boreholes from the bottom of the shaft to test for further water which was also sealed, intersected leader and basal reefs carrying low gold values at about 2,000 ft. below the collar. A borehole from the 7th level station also disclosed low values.

The measured depth of No. 1 shaft at **Western Holdings**, also in the Free State, at June 30 was 1,185 ft. Difficulty was experienced in sinking through the Ventersdorp lavas due to the fractured nature of the ground. The existing temporary sinking hoist will be inadequate for sinking below a depth of 2,000 ft. and progress beyond this depth will depend on the delivery of permanent equipment.

The sinking of No. 2 shaft started on April 1, and reached 346 ft. at the end of June.

Construction of the shaft collar of No. 1 shaft, **Free State Geduld**, was completed and sinking operations started on May 21. The shaft reached a depth of 165 ft. at the end of June, while No. 2 was sunk another 450 ft. to 1,025 ft.

President Steyn Gold Mining Co. Ltd.'s No. 1 shaft started sinking during the quarter and was down to 308 ft. Excavation for the shaft collar foundations were completed to a depth of 40 ft. at No. 2 shaft, and the construction of the collar is well advanced.

At **Welkom Gold Mining Co.**, No. 1 shaft was sunk 387 ft. to 1,213 ft., delay having been caused by the intersection of water-bearing fissures. No. 2 shaft was sunk 214 ft. to 1,730 ft. below collar. Water-bearing fissures and faulted ground also retarded operations. The first 5,000-cfm. compressor unit was brought into commission at the shaft and work started on erecting the first permanent winder.

On the Far West Rand, the Annan shaft at **Doorfontein Gold Mining Co.** was sunk 147 ft. to 1,536 ft. A change over was made from the first stage to the permanent and second stage winding equipment. Work on both the left and right hand winders and the permanent headgear has been completed.

No. 1 shaft was sunk 443 ft. to 1,000 ft. At a depth of 573 ft., the shaft passed out of the leached zone consisting of wad, clay, gravel and a very small amount of solid dolomite into solid dolomite with numerous bands of chert.

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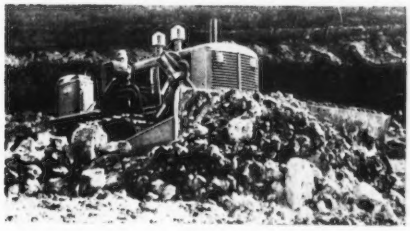

Allis-Chalmers HD-19 pulling a 12-ton "rooter" scrapes heavy shale off rock vein in final stage of stripping at National City, Michigan. A General Motors 6-71 Diesel powers the HD-19.

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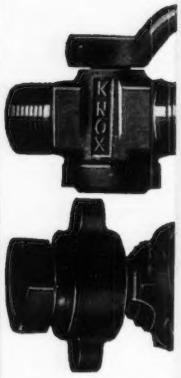

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which was drilled for Free State Gold Areas, Ltd., intersected Leader Reef at 6,236 ft. 5 in. A conglomerate in this horizon assayed 2.65 dwt. over 7.5 in.

The basal reef, intersected at 6,261 ft., assayed 24.8 dwt. over 6.25 in.

Arrangements have been made for a series of directional deflections to encircle the borehole.

It will be recalled that the third deflection in this borehole gave the phenomenally high value of 56,105 in.-dwt. Other deflections gave values of between 176 and 271 in.-dwt. in basal reef.

On a farm adjoining Erfdeel, values of between 242 and 252 in.-dwt. were obtained in basal reef in the hole DNK 1 on the farm Dankbaarheid 187. Basal reef was encountered at 6,534 ft., and assayed 45.3 dwt. over a true width of 4.98 in.

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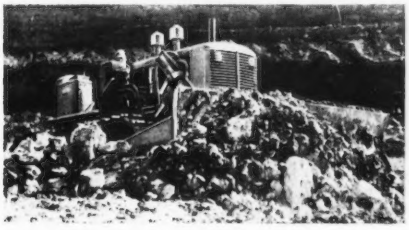
GM Diesel-powered Koehring 605 dragline with 1½ yd. bucket, loads shale in Euclid bottom dump. The GM Diesel-powered Euclids haul 17 yard loads up a 15% grade climbing out of the cut.



Allis-Chalmers HD-19 pulling a 12-ton "rooter" scrapes heavy shale off rock vein in final stage of stripping at National City, Michigan. A General Motors 6-71 Diesel powers the HD-19.

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"We get more work done at about one-half the cost," says Mr. Leffler. "We went to the one make of engine 100% because of our previous satisfactory experience. Standardization on GM Diesels also helps keep our parts inventory low."

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Africa *(Continued)*

At **Vogelstruisbult Gold Mining Areas Ltd.**, the footage advanced in No. 3 shaft was 132 ft., bringing the shaft to a final depth of 6,662 ft.

West Driefontein Gold Mining Co. showed 100% payability in the 70 ft. sampled on the carbon leader reef during the quarter, the value being 67.7 dwt. over a reef channel width of 10.4 in. In the previous quarter the mine also showed the same payability.

No. 1 shaft was sunk to 2,395 ft., while No. 2 was sunk to 3,082 ft. During April and part of May, progress was retarded in No. 2 shaft by the unstable nature of the ground which required consolidation by cement. After consolidation more stable ground was encountered and satisfactory progress was made. No. 3 shaft was sunk to 629 ft. Operations were retarded by lengthy cementation periods required for the consolidation of the fissure near the eastern side of the shaft. Work is progressing on the erection of the platform hoist and permanent headgear at No. 4 shaft.

INDIA

★Manganese exports from India are showing a substantial increase over 1948. Official reports state exports to the U. S. in the first five months of 1949 were on the order of 143,000 metric tons, compared with 134,000 the year before. Britain got 50,000 metric tons, almost three times more than a year ago, and Belgium, Germany and Japan split 30,000 between them, compared to negligible shipments in 1948. Much of the boost is attributed to the running of special ore trains between the Central India fields and the port of Vizagapatam.

Kyanite ore exports from India also are well up. In the first five months of 1949 roughly 6,000 metric tons were shipped. This is nearly twice shipments in the same period the year before.

★The four mines in the Kolar Gold Field in Mysore State, India, were back in form in June, producing a total of 16,110 fine oz., of which **Mysore mine** contributed 5,112 fine oz.

★From India's Hyderabad State, meanwhile, comes an announcement that a pilot recovery plant working at Raichur has produced approximately 7,689 fine oz. in the period Sept., 1948, to June, 1949. The mining company is controlled by the state government and has a ten-year management contract with **John Taylor & Sons**, the British firm which runs the Kolar mines. The main gold recovery plant at Raichur will be operating on the amalgamation process by this October, it is reported, and a cyanide plant with a capacity of 150 metric tons of ore should be installed by next February.

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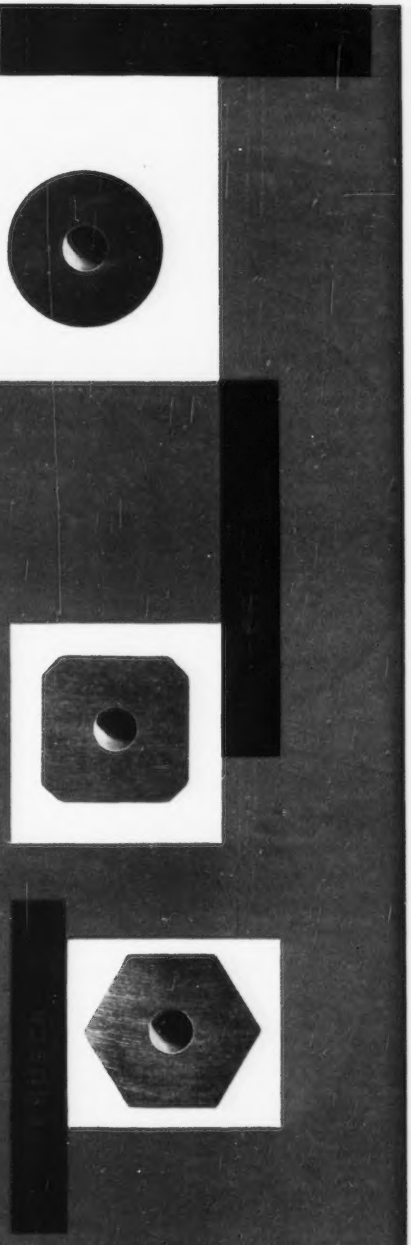

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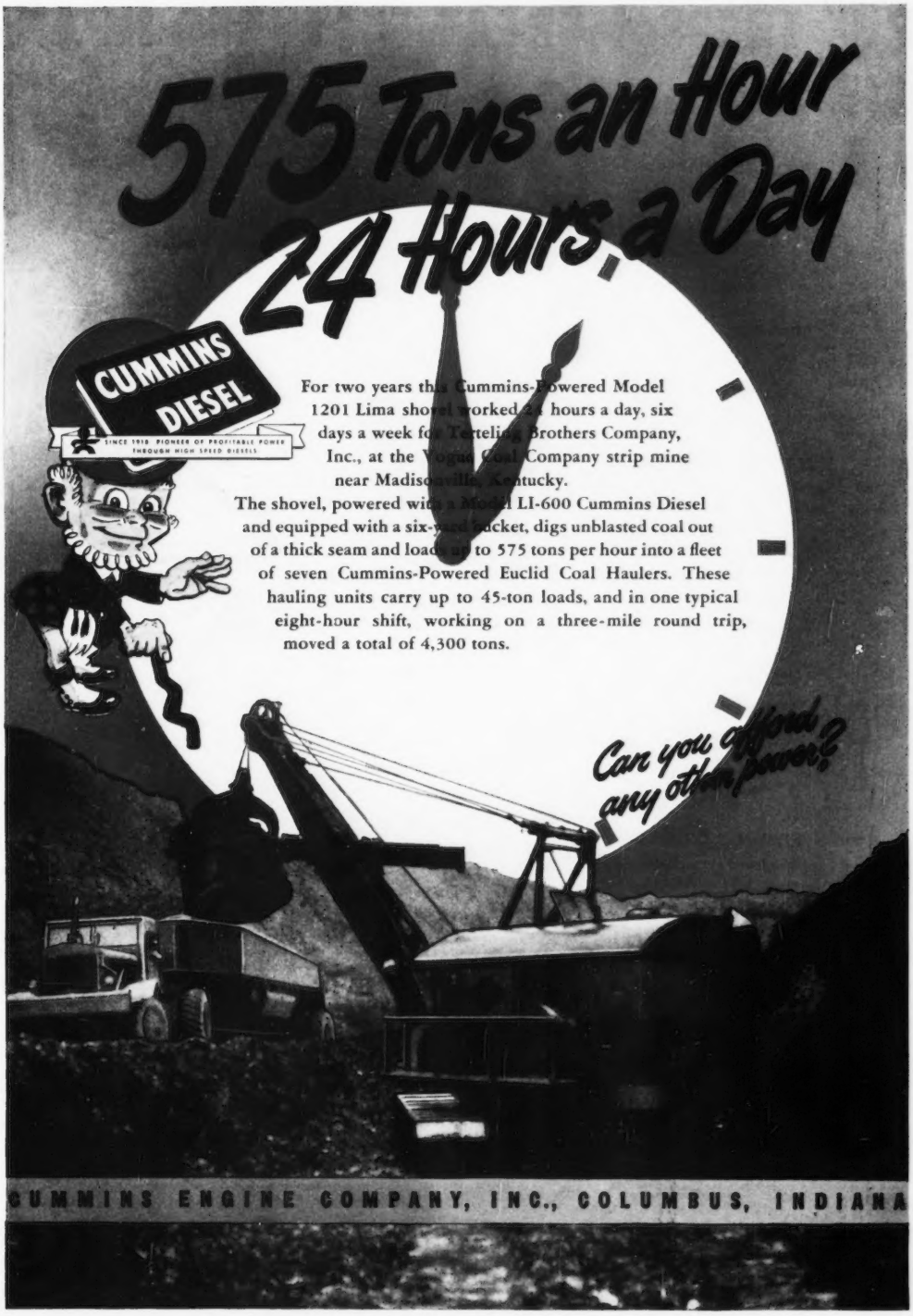
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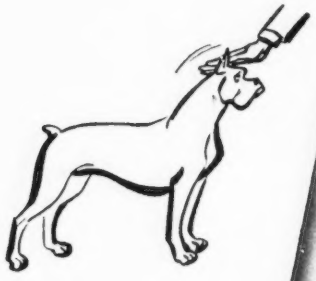

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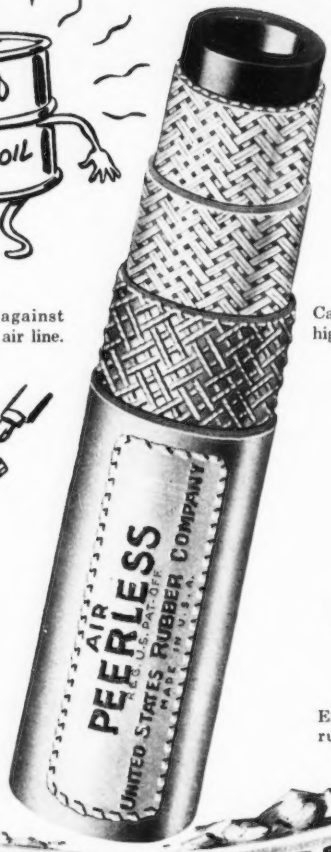

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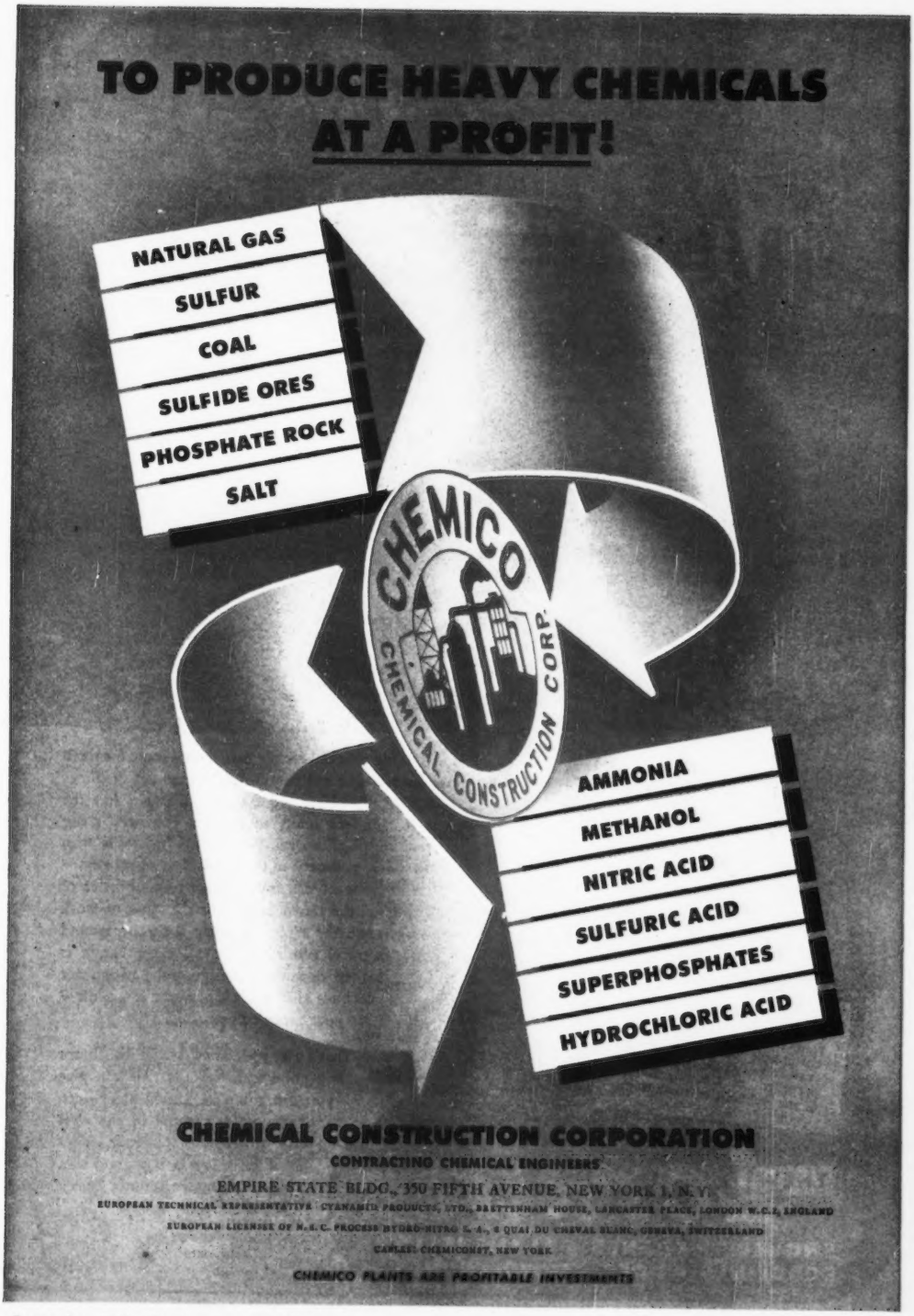
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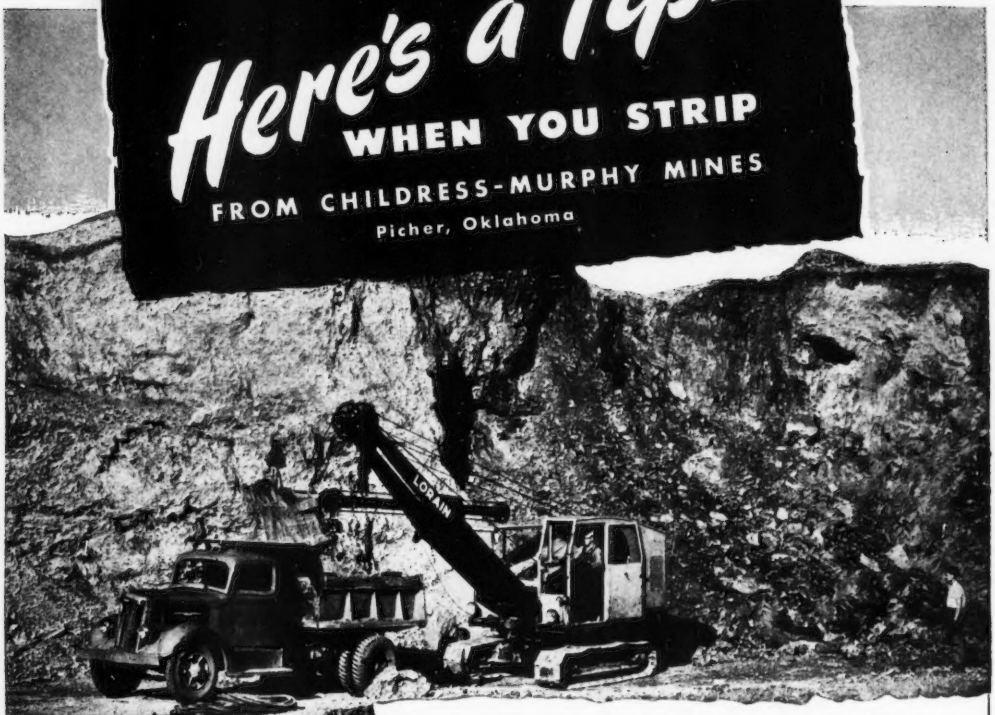

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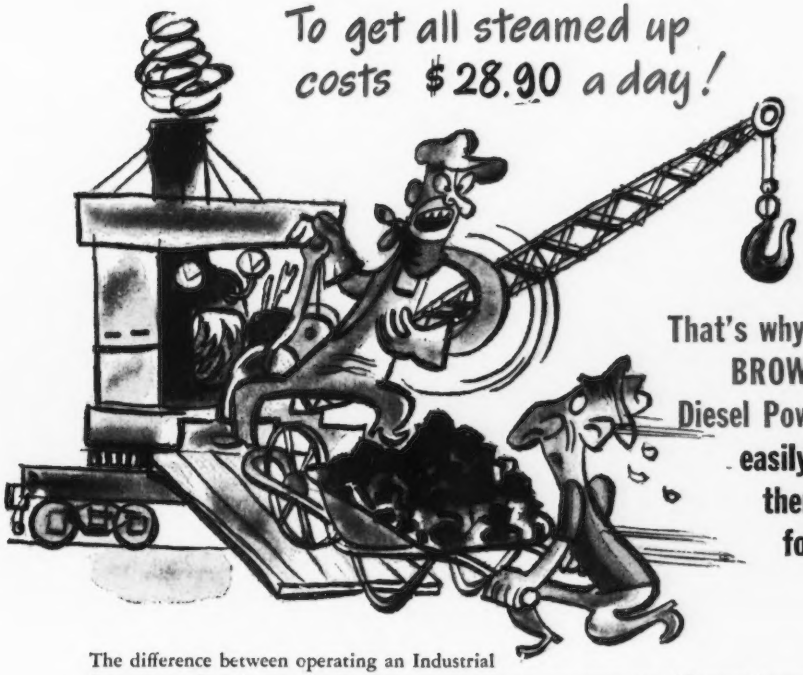


That's why INDUSTRIAL BROWNHOIST Diesel Powered Cranes easily pay for themselves in four years.

The difference between operating an Industrial Brownhoist Diesel Crane and a steam-operated unit can mean the difference between profit and loss. Look at these typical figures:

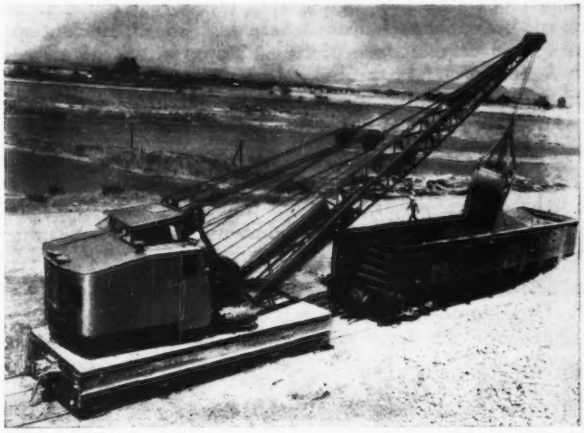
SAVINGS IN FUEL PER DAY	$13.40	(Based on 1½ tons coal per day at $10 a ton, against 16 gallons of fuel oil at 10c a gallon.)
SAVINGS IN LABOR PER DAY	$15.50	(Unproductive firing, banking, cleaning time —2 hours for engineer at $1.75 per hour, and 8 hours fireman at $1.50 per hour.)
TOTAL FUEL AND LABOR SAVINGS PER YEAR	$7,514.00	

PLUS 65 ADDITIONAL OPERATING DAYS A YEAR!

It takes two hours a day on the average for firing, banking, taking coal and water, boiler washouts, etc. That totals 10 hours weekly, 520 hours annually—or 65 extra days of productive crane time per year.

AND THESE ADVANTAGES:

Safer, cleaner operation; greater production and less operator fatigue because of 360° visibility from monitor-type cab and air operated controls; reduced maintenance time —about half that of steam; elimination of smoke nuisance and fire hazard. Write for complete information.

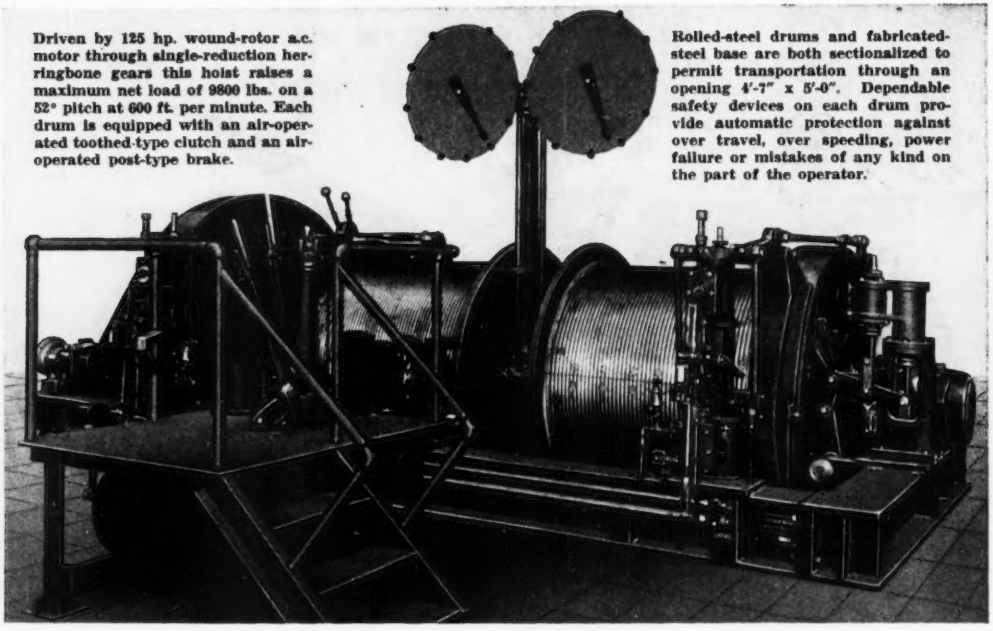


***BROWNHOIST** BUILDS BETTER CRANES . . . with Diesel power*

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • **AGENCIES:** DETROIT, BIRMINGHAM, HOUSTON, LOS ANGELES, PORTLAND, SAN FRANCISCO, SEATTLE, SPOKANE, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC.

Driven by 125 hp. wound-rotor a.c. motor through single-reduction herringbone gears this hoist raises a maximum net load of 9800 lbs. on a 52° pitch at 600 ft. per minute. Each drum is equipped with an air-operated toothed-type clutch and an air-operated post-type brake.

Rolled-steel drums and fabricated-steel base are both sectionalized to permit transportation through an opening 4'-7" x 5'-0". Dependable safety devices on each drum provide automatic protection against over travel, over speeding, power failure or mistakes of any kind on the part of the operator.



FOR UNDERGROUND OPERATION
IN A NEW JERSEY ZINC MINE

This double-drum hoist had to be lowered down an inclined shaft and transported a considerable distance underground through openings as small as 4'-7" x 5'-0". That meant sectionalized design and construction.

Hoisting from a number of different levels required a separate clutch and brake for each drum. Safe, high-speed, efficient operation required correct dimensions and proportions of all parts; ample factors of safety throughout; high-torque electrical power under finger-tip control and dependable safety devices on each of the two rolled-steel drums.

SATISFACTORY SERVICE for the past three years has proved that Vulcan engineers, working in close cooperation with the purchaser's engineers, produced the right hoist for the job—as they have for scores of other leading mining companies during the past hundred years.

Write us regarding any present or prospective hoisting requirement. Our engineers welcome opportunities to make money-saving suggestions, whenever possible, without charge or obligation.

Two sectionalized Vulcan Allcasteel Sheaves were furnished with this hoist. Besides being light, strong and tough they are so highly resistant to rope wear that NO LINERS ARE NEEDED. Available in all sizes, with either plain or anti-friction bearings.

1849 VULCAN CENTENNIAL 1949

Vulcan Iron Works
WILKES-BARRE, PA., U.S.A.

Other Vulcan products include Cages and Skips, Shaking-Chute and Chain Conveyors, Rotary Kilns and all types of Locomotives for underground and surface haulage. Write for illustrated bulletins.

Load it up with PRIMACORD

. . . and take it away. Good digging means lower costs per yard, more yards per minute.

Primacord detonates throughout its length, at a speed of about four miles per second! Down-hole lines are in direct contact with the entire charge, even in deck loads; and detonate each cartridge with full power. Main lines connect all holes in a planned sequence of fire power to relieve burden and produce better fragmentation.

Add the fact that Primacord is easy to hook up without tools—is resistant to ordinary shock and stray electrical currents — can be used in wet weather — and you have many added profitable reasons for using it in your blasting.

There's a grade of Primacord to meet every blasting condition. Ask your supplier about it, or write direct to The Ensign-Bickford Company, Simsbury, Connecticut.

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PRIMACORD-BICKFORD Detonating • Fuse •

Also Ensign-Bickford Safety Fuse Since 1836

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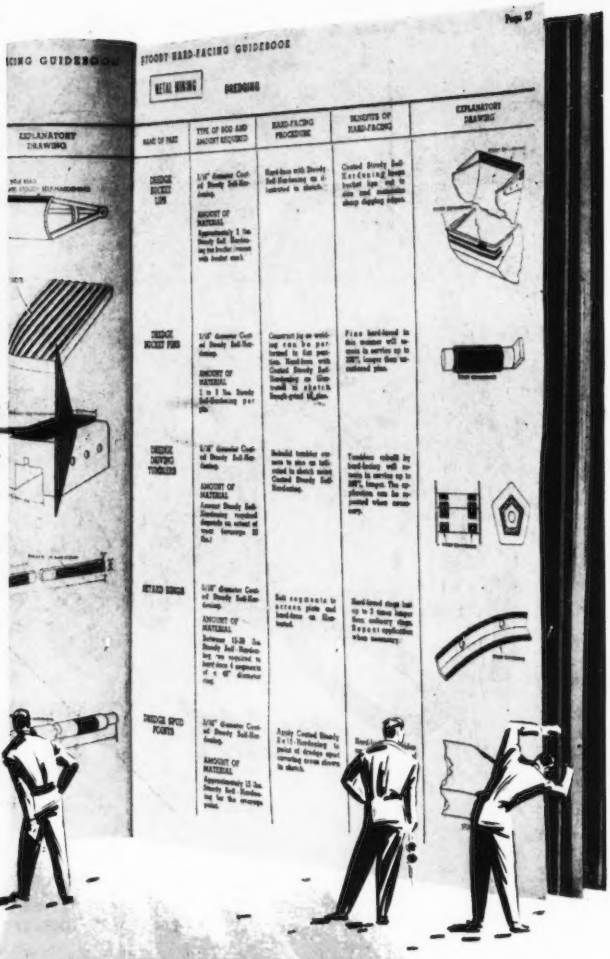

a valuable aid to maintenance men!

A lot of hard-facing success is in the use of correct alloys applied in the right way. If you want to eliminate failures, gain utmost life increase and savings in equipment dollars—get your copy of the STOODY HARD-FACING GUIDEBOOK!

Clear, concise descriptions of each hard-facing application provide the all-important know-how for common earth handling-crushing-mixing equipment in your industry. It costs you nothing—may provide the answers to more economical operation, fewer equipment breakdowns, more profit!

Simply ask for the "STOODY HARD-FACING GUIDEBOOK" on your letterhead; it will be mailed post-paid to your personal attention. *But it can't help you until it's in your hands—Write today!*

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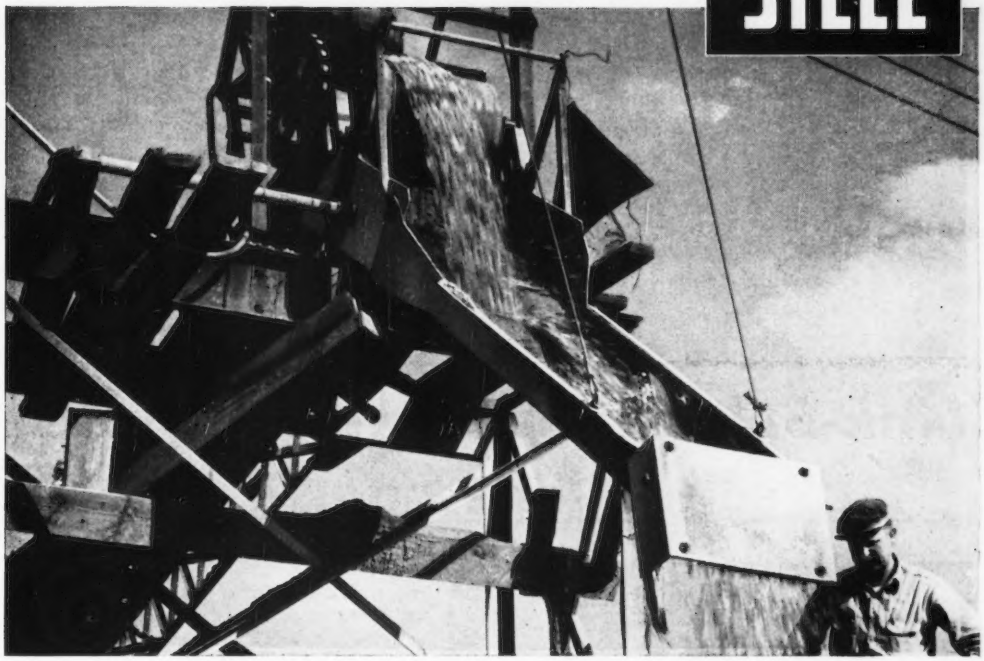
MASSAPONAX SAND & GRAVEL CO.

gets 5 to 10 times More Service

FROM J&L HEAT-TREATED JALLOY STEEL PLATES

J&L STEEL



Money is saved when J&L Jalloy replaces mild steel on chute bottoms and baffle plates

Mild steel baffle plates on the gravel-loading chutes were replaced every three or four days. Now Jalloy baffle plates last *six to seven weeks—ten times as long!*

Mild steel chute bottoms lasted an average of three weeks. Jalloy plates in the same application now last an average of *four months—five times as long!*

This is the record of J&L heat-treated Jalloy steel plate at Massaponax Sand & Gravel Co., Fredricksburg, Virginia. As a result of this record on their first order of Jalloy from William G. Wetherall, Inc., Baltimore, Md., Massaponax now uses Jalloy exclusively for chute liners.

J&L Jalloy is a manganese-moly alloy steel heat-treated to resist abrasion and impact. It is a *modern* steel for products such as: chutes, conveyors, heavy-duty truck bodies, power-shovel buckets, dump cars, bulldozers, scrapers, rock crushers—products that must resist wear.

Heat-treated Jalloy is available in bar and plate form with widths up to 72 inches, lengths up to 20 feet, and thicknesses from 3/16 inch to 2½ inches.

Let us send you the data booklet: "Jalloy—J&L Alloy Steel." It contains information on properties, heat treatments and workability.

Jones & Laughlin Steel Corporation
412 Jones & Laughlin Building,
Pittsburgh 19, Pa.

Please send me your data booklet: "Jalloy—J&L Alloy Steel."

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Do you recommend J&L Jalloy Steel for:

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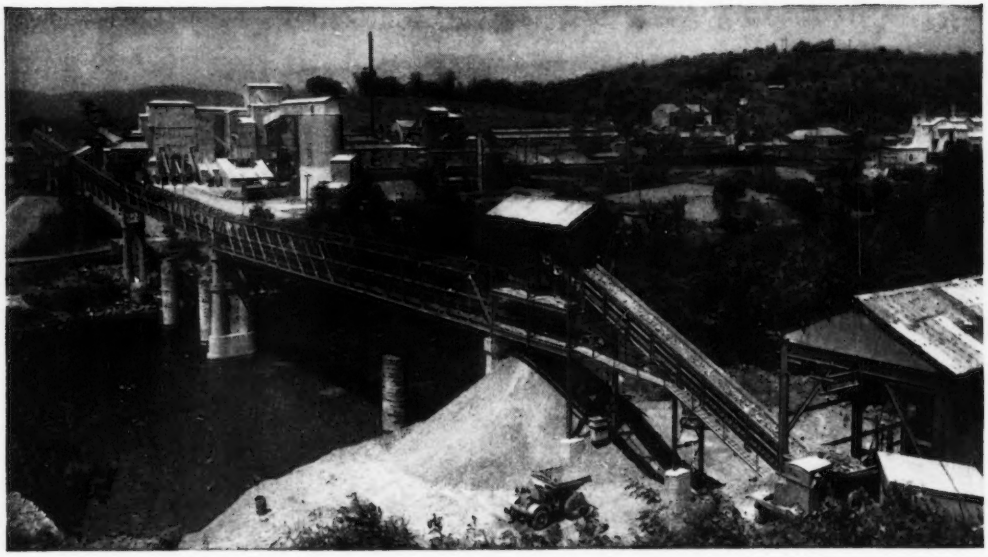
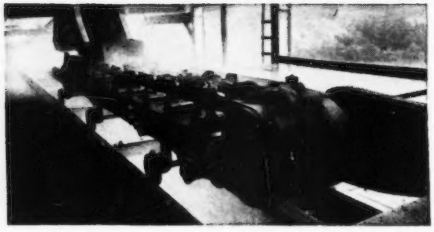
From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

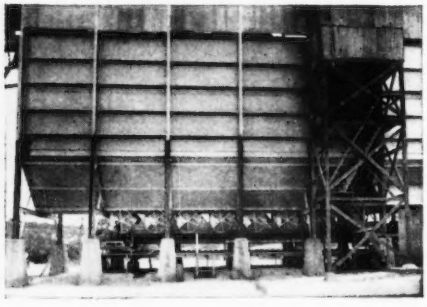
PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS



Link-Belt bridge conveyor system solves lime quarry problem



Above: Reversing shuttle belt conveyor, for distributing material throughout 70′ length of bin; equipped with rubber-tread impact type idlers. Below: Side view of 1400-ton capacity stone storage bin of all-steel construction. Note large hand wheels on the stone discharge gates.



Another unusual handling problem solved by a Link-Belt integrated conveyor system is at Riverton Lime & Stone Co., Inc., Riverton, Va., where the stone is taken across a river.

From the crusher the stone is conveyed to the top of a Link-Belt "CA" vibrating screen by means of a 42″ x 100′ steel apron conveyor at an angle of 30°. The material from both screen decks is conveyed across the river by a 30″, 674′ centers roller-bearing belt conveyor. The fines from bottom deck of "CA" screen may either pass to belt conveyor or be discharged to ground as a bleed-off operation.

On the plant side of the river the belt conveyor discharges to 30″ reversing shuttle belt conveyor serving a 1400 ton steel storage bin. Stone is discharged by eight Link-Belt bin gates and a 42″x60′ centers apron conveyor serving conveying facilities of the original plant.

Let us give you the complete story on this and other rock products handling and screening operations.

LINK-BELT COMPANY 11.530

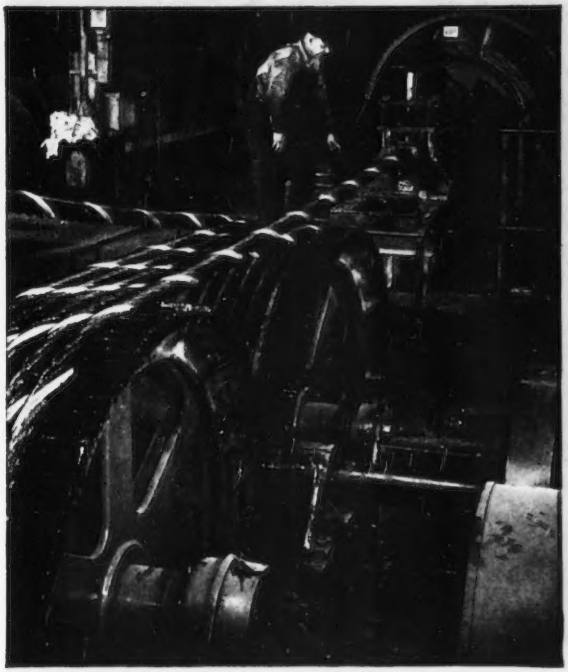
Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 3, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

LINK-BELT

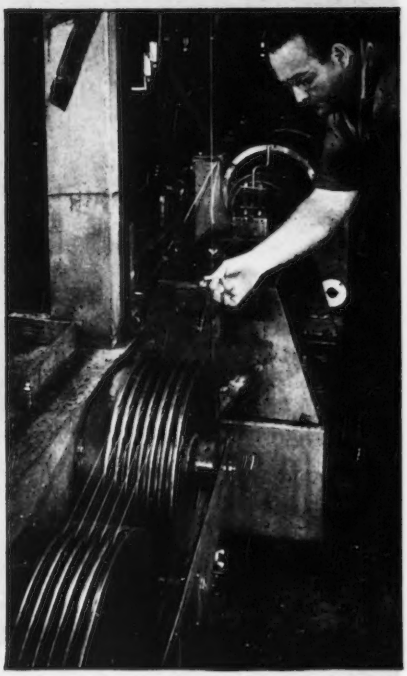
CONVEYING MACHINERY

"THE COMPLETE LINE"

This photograph shows a 3⅛" diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.



In this photograph is a 3/64" diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



Whether you need

LARGE WIRE ROPE or SMALL WIRE CORD

make your selection from

a thousand and one
WIRE ROPES
made by
MACWHYTE

You will get smoother operation and better service when you use the wire rope designed and manufactured to meet your requirements.

Macwhyte engineers are always glad to suggest the correct Macwhyte rope or cord best suited to your needs.

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MACWHYTE COMPANY

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Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, Atlas Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope.

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Catalog on request.

RESIST ABRASION

...by using

NI-HARD

CAST IRON

These Ni-Hard castings include parts for 6" and 12" "HAZLETON" Type "CT" pumps. Although a difficult and unusual feat, they have been machined with carbide tools. The Ni-Hard pump castings weigh up to 2300 pounds and are made for capacities as high as 6000 gpm—with up to 50% abrasive solids.

Ni-Hard* . . . *the hardest commercially available product of the cast iron industry* . . . provides exceptional abrasion resistance.

The Brinell hardness of this nickel-chromium iron ranges from 550 to 650 when sand cast. When chill cast it is as high as 725 BHN.

Difficult abrasive solids-handling problems are constantly being solved by use of Ni-Hard. For instance, Barrett, Haentjens & Company, Hazleton, Pa., cast and machined Ni-Hard parts, such as those shown above, for their Type "CT" sludge pumps.

Ni-Hard minimizes maintenance and replacement costs and assures customer satisfaction.

Ni-Hard is widely used to extend the life of mine equipment.

*Reg. U. S. Pat. Off.

FULL INFORMATION IS YOURS FOR THE ASKING

Mail the coupon for these two booklets. One gives details of Ni-Hard composition, properties and applications . . . the other, lists producers of Ni-Hard castings. Mail the coupon now.

The International Nickel Company, Inc.
Dept. E.M.J., 67 Wall St., New York 5, N. Y.

Please send me booklets entitled:
"Engineering Properties and Applications of Ni-Hard" and
"Buyers Guide for Ni-Hard Castings"

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New GOULD "Z" Plate—

THE ONLY PLATE WITH THE SOLID, NON-POROUS GRID

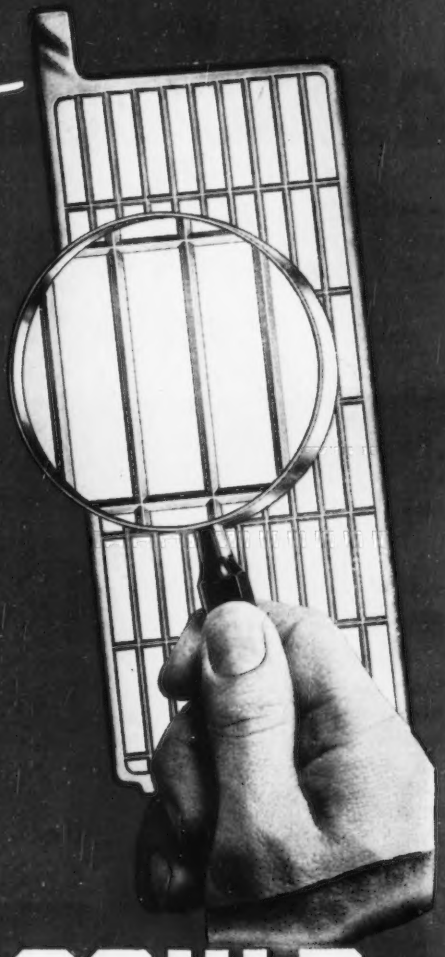
Gould research engineers have developed a revolutionary new plate containing the only grid in existence that is non-porous and completely solid all the way through.

This new, non-porous "Z" grid is the result of "Progressive Solidification"—a new, advanced casting technique developed and perfected by the Gould Research Laboratory and proved in Gould's own pilot plant.

"Progressive Solidification" casting brings you more reserve . . . more vitality at full capacity . . . more for your battery dollar than ever before.

Ask for literature on how Gould's new casting development makes Gould Batteries Start Many, Longer.

The Gould "Many" More than ever—America's Most Modern Power Battery.



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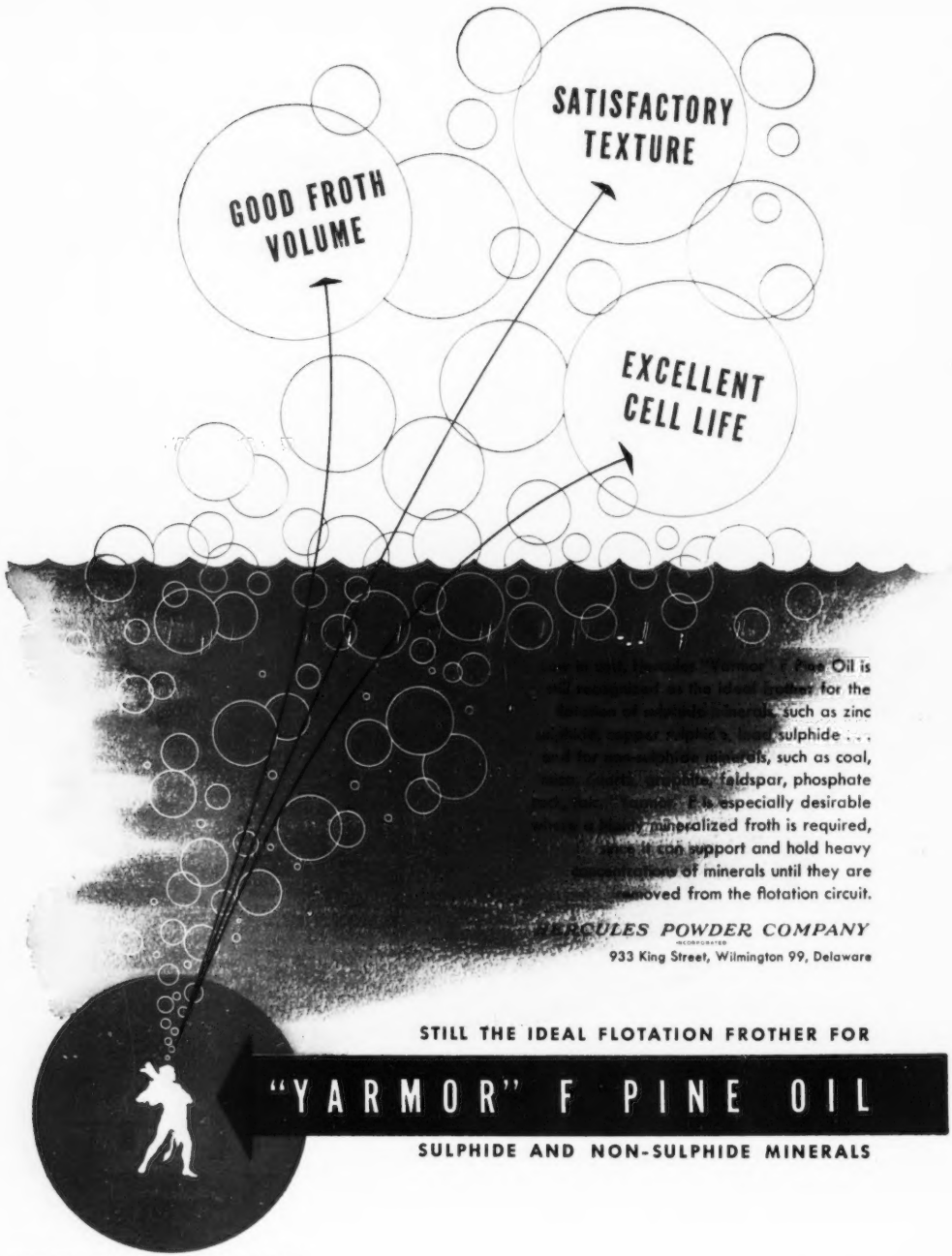
Always Use Gould Automobile and Truck Batteries



Oil is
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minerals, such as coal,
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especially desirable
mineralized froth is required,
it can support and hold heavy
of minerals until they are
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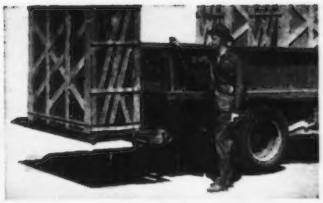
SULPHIDE AND NON-SULPHIDE MINERALS

HAVE YOU TRIED THIS NEW COLLECTOR?

Hercules Rosin Amine D provides a relatively new cationic flotation reagent—an excellent collector for silica and siliceous minerals. It can be used to beneficiate many non-metallic and oxide ores, such as feldspar, phosphate rock, cement rock, and iron ore. Write for details.

"YARMOR" IS REG. U. S. PAT. OFF. NM 9-1



The Heiloader hydraulically-operated truck tailgate handles a capacity load of 2000 lbs. Use it to save time and money.

Heil Bodies and Hoists

assure less downtime..because

(1) HEIL Bodies use both cross members and long members of the subframe for support, giving you extra strength and longer life

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More days on the job, lower maintenance and repair expense mean *lower hauling costs* with Heil Bodies and Hoists. These money-saving dump units are built to stand up under heavy punishment — to stay on the job and get results. For full information on Heil Bodies and Hoists send in the coupon below, today. BH-141A

Heil's standard contractors' body has V-section side braces that prevent tailgate spreading.

Heil's heavy-duty rock body for off-the-highway operations. 70° dumping angle gives fast, clean discharge.

There's a sturdy Heil Power Take-off for every make of truck transmission.

Only two wearing parts in a Heil oil-gear pump —and they are reversible and easily replaced.

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Please send me bulletins describing the dependable Bodies and Hoists shown in this advertisement.

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MODEL SM3

Here is the finest portable survey instrument made for tracking down elusive uranium ores. Of lightweight welded aluminum construction it weighs only 8¾ pounds, is completely waterproof and can be carried anywhere. A self-contained Geiger-Muller counter tube probe unit attached to the instrument by a 30" cable makes taking measurements in crevices and confined places an easy matter. Radiation intensities can be read in a few seconds directly from the indicating meter. Its three full scale ranges detect the most sensitive impulses, with instantaneous accuracy. Backed by 14 years of design experience, the SM3 is ideally suited to rugged use in the field without sacrificing any of the delicate sensitivity of laboratory equipment.

Outstanding Features:

- Battery life in excess of 200 hours
- No Tools necessary to replace batteries
- Instantaneous readings directly from scale of 3" meter
- Uses standard miniature type radio tubes
- Counter tube sensitive to both Beta and Gamma radiation
- Complete and ready for operation **$225**

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America's Foremost Crafters Of Scientific Equipment

A COMPLETELY EQUIPPED PRECISION ELECTRONICS PLANT TO SERVE YOU

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HEWITT-ROBINS CONVEYORS HELP SET BULK MATERIALS-HANDLING RECORDS!

Stretching down the 700-foot-long pier at Curtis Bay in Baltimore are these four Hewitt-Robins conveyors.

Together they can load two ships at a time with 17,500 tons in less than 1 hour and 45 minutes. That's 10,000 tons an hour! No wonder this installation has set new records for speed and efficiency!

You can be sure of speed and efficiency when you use Hewitt-Robins Conveyors to move coal, ore, limestone, etc. That's because these conveyors are designed, engineered and built by a single source. Hewitt-Robins offers you a *complete conveyor system* . . . and takes full responsibility for *all* elements.

You see, H-R Conveyors are engineered with idlers, pulleys and drive built by Robins. You benefit by these three exclusive advantages of Robins Idlers: (1) *One-Shot Lubrication*—requires only half the time and only one walkway. (2) *Triple-Grease Seal*—seals grease in, locks dirt out. (3) *Rigid Truss Construction*—stronger than any other type of construction.

The belting of your H-R Conveyor is built by Hewitt—leading manufacturers of industrial rubber products for more than a half century. The strong, durable cover of this belting is made of shock-absorbing rubber which withstands extreme gouging, tearing and abrasion . . . resists moisture and mildew.

Little wonder, then, that Hewitt-Robins Conveyors can help you move your bulk materials more quickly . . . more economically!

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Find out about Hewitt-Robins Conveyors and belt conveying systems now. Write to Robins Conveyors Division, Passaic, New Jersey, or Hewitt Rubber Division, Buffalo 5, New York, or to Robins Engineers, 157 Chambers St., New York 7.

ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

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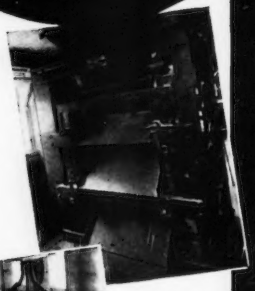
magnetic equipment for every mining requirement!

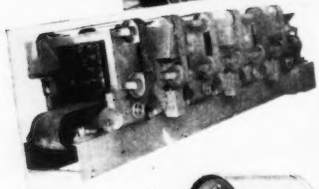
Dings Rectangular Electromagnet provides maximum iron removal above belts or chutes. Triple pole design for great magnetic strength and depth of penetration. Maximum magnetic strength across entire magnet face. Easily installed in any position. Low operating cost . . . trouble free . . . complete range of sizes.

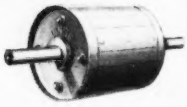


(Right) Induced Roll Separator purifying sand.

Battery of Crockett Separators concentrating magnetite. (Left)

Magnetic Detector signals presence of tramp iron. (Right)





NEW, powerful Cross Belt Separator — with higher selectivity — for concentration and purification (Above)

NEW, powerful, non-electric Alnico Perma-Pulley for purifying, cobbing, protecting crushers, pulverizers, etc. Magnetic permanence guaranteed for life of installation. (Above)

Wherever crushers must be protected against tramp iron, wherever magnetic separation can contribute to the beneficiation of ores, you will find Dings magnetic separators specially designed to meet the requirements of the job. Dings magnetic separators have played an important role in making the extraction of many minerals possible and economically feasible. Shown here are a few of the machines which Dings has pioneered exclusively for the mining industry for the following purposes:

CONCENTRATION—everything from specially designed pulleys for cobbing nickel ores to powerful induced roll and cross belt separators for concentrating manganese, tungsten, chrome, titanium and many other minerals.

PURIFICATION—removing small amounts of feebly magnetic impurities with super high intensity separators. Minerals treated include feldspar, silica sand, salt, bauxite, barytes, nepheline-synenite, gypsum.

CRUSHER PROTECTION—magnetic pulleys, pulley type separators, drums, suspension magnets, spout magnets and magnetic detectors are all widely applied for arresting tramp iron ahead of crushing equipment.

WET TYPE SEPARATORS—Dings has pioneered in the development of wet type separators for concentrating magnetite and for use in new processes for concentrating low grade ores. *Ask for complete details of Dings Separators for Heavy Media Process Plants.*

Take advantage of Dings equipment and experience. For practical recommendations, submit your requirements with 25 lb. samples of material to the Dings Laboratory for testing and analysis. Literature on request.

DINGS MAGNETIC SEPARATOR CO.
4716 W. ELECTRIC AVENUE, MILWAUKEE 14, WISCONSIN

"Magnetic Separation Headquarters Since 1899"

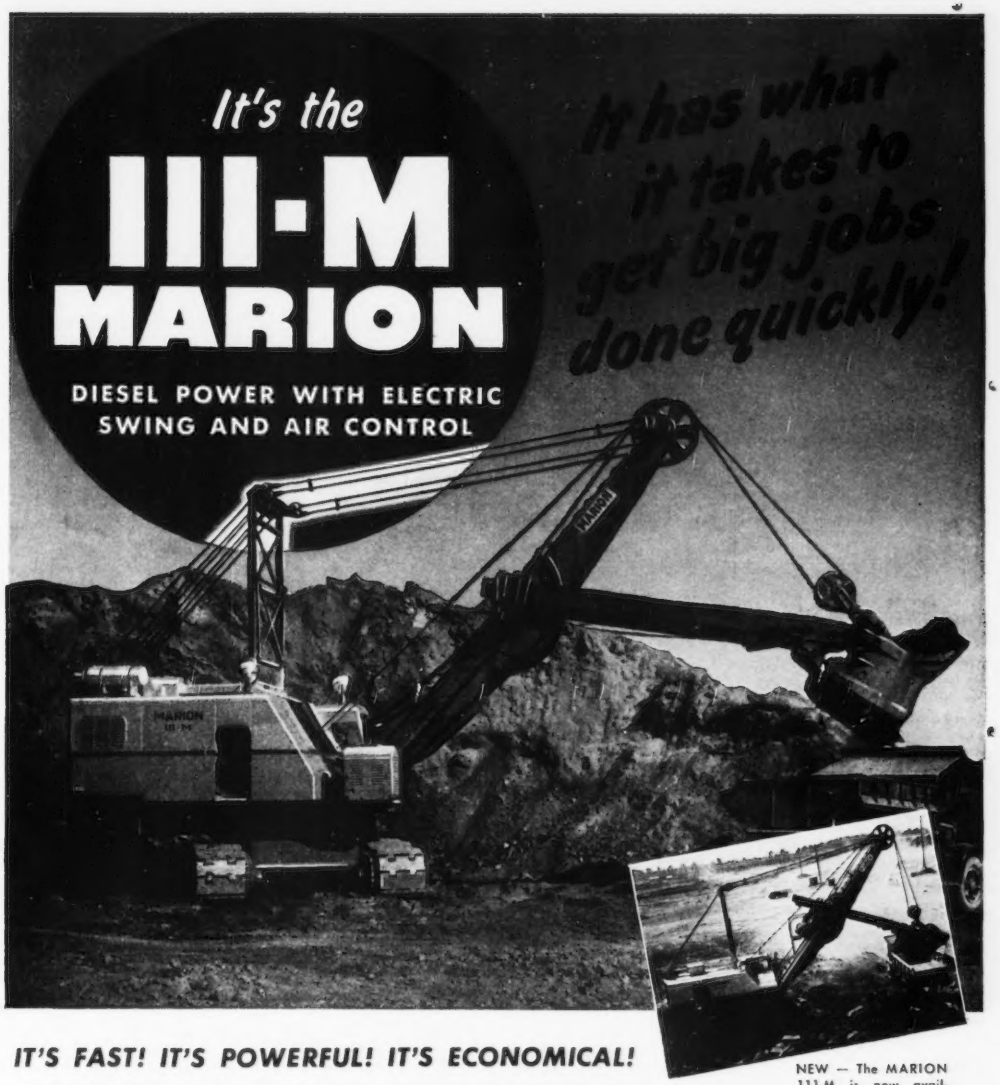
Dings
"HIGH INTENSITY"

It's the

111-M MARION

DIESEL POWER WITH ELECTRIC SWING AND AIR CONTROL

It has what it takes to get big jobs done quickly!



IT'S FAST! IT'S POWERFUL! IT'S ECONOMICAL!

Put this husky 3½-4 cubic yard machine to work on your toughest construction jobs. The MARION 111-M is setting production records across the country. It's a blend of speed, power and economy that gets big jobs done quickly. Delivery dates?—earlier than you might think. Why not check your nearest MARION District office or agent today?

NEW — The MARION 111-M is now available as an all-electric machine with full Ward-Leonard Control.

MARION

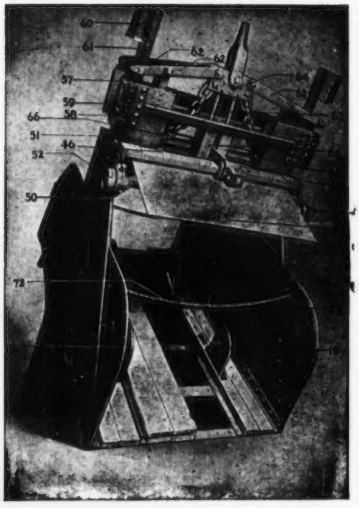
POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities

COST REDUCING

Lepley MINE EQUIPMENT

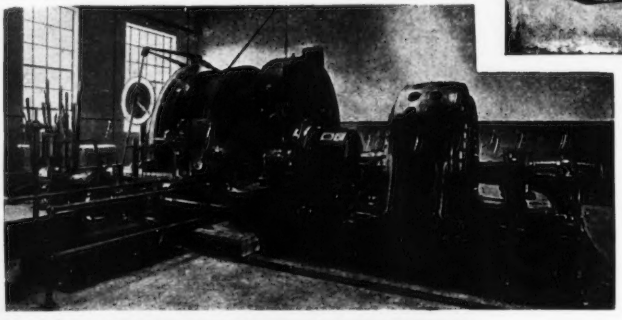


For nearly 50 years we have pioneered in the construction of equipment designed to stand up under the hardest kind of service—and low enough in original cost to keep overhead and depreciation within reasonable limits.

On this page is just a sample of the operating equipment we supply. Other items available: Steam or Electric Hoists and Haulages, Self Dumping Safety Cages, Bottom Discharge, Skips, Overturning Skips, Overturning Cage (End Dump), Solid Car Side Dump Cage, Bottom Loading Skips, Hard Steel Liner, Head Sheaves, Shaft Bearings, Rotary Dumps, Mine Fans, Mine Pumps, Revolving Slate Dump Larries, Rectangular and Beehive Coke Oven Machinery, Fort-Pitt Mine Equipment and allied equipment.

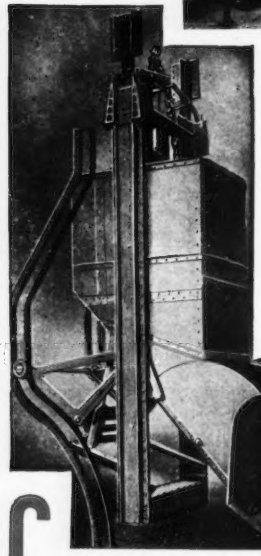
HOISTS

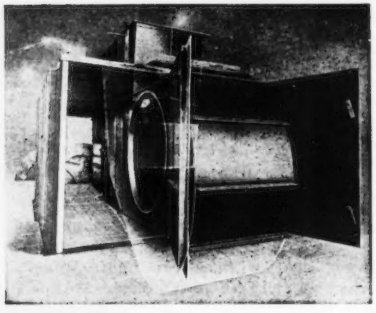
We have no "standard" hoist line — each design is based on a study of your needs. Steam and electric shaft and slope hoists available.



CAGES

Simplicity, ruggedness, safety and low maintenance are stressed in the design of Lepley Cages—your answer for efficient handling.





FANS

Reversible supply or exhaust fans to suit your mine. Sizes up to 35 ft. in dia. by 8 ft. face. Produces 700,000 cu. ft. min. at 10.3 inches water gauge.

SKIPS

Leading coal mining companies testify—Lepley Skips meet rugged requirements at lowest cost . . . tops for efficient material handling.

Write—ASK FOR DESCRIPTIVE BULLETINS

•

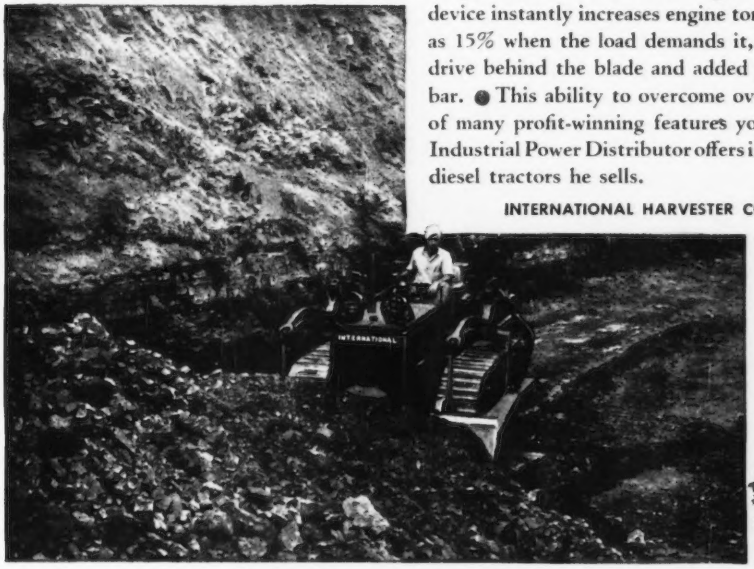
SEND US YOUR PROBLEMS

CONNELLSVILLE MFG. & MINE SUPPLY CO. CONNELLSVILLE PENNA.

SLEEPER

Hidden power to pull through heavy going gives every International diesel crawler the winning advantage in work capacity. ● Governors with built-in torque control assure a bulldog hang-on. This device instantly increases engine torque as much as 15% when the load demands it, putting added drive behind the blade and added pull at the drawbar. ● This ability to overcome overloads is but one of many profit-winning features your International Industrial Power Distributor offers in the International diesel tractors he sells.

INTERNATIONAL HARVESTER COMPANY • CHICAGO



For cleaning off overburden, building access roads, feeding shovels or pushing coal or ore to hoppers or chutes, International diesel crawlers excell. From the TD-9 shown here, to the mighty TD-24, you have a choice of four heavy-duty tractors to fit your needs.

Standardize on Power that Pays

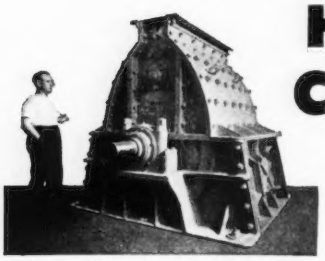
CRAWLER TRACTORS
WHEEL TRACTORS
DIESEL ENGINES
POWER UNITS

INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER

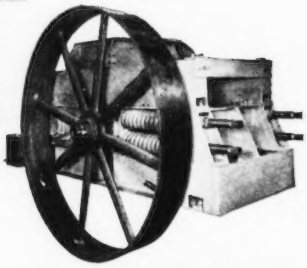
GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY FOR 64 YEARS

GRUENDLER
Heavy Duty
CRUSHERS



GRUENDLER 6 X Series Patented CENTER FEED PULVERIZERS

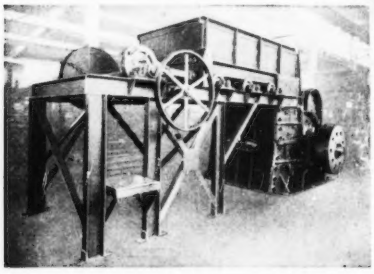
For high capacity secondary reductions up to 300 Tons per hour, — 150 Tons per hour, — 10 mesh and finer.



GRUENDLER PRIMARY and SECONDARY ROLL CRUSHERS

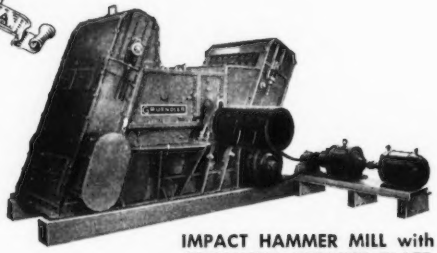
Gear drive or double pulley drive. Roller bearings on main shafts to counter shafts. Water jackets and circulating lubricant systems for handling hot ore or slag. One piece manganese shells also special shells with reversible teeth segments for special work.

TRADE MARK



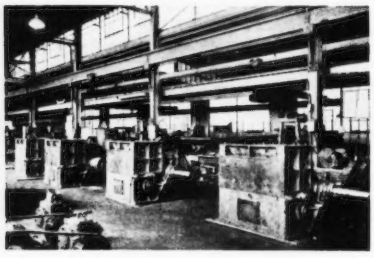
HEAVY DUTY PRIMARY IMPACT MILL WITH TRAMP IRON CATCHER and FEEDER

Feeds shovel size rock . . . Capacities 50 to 500 Tons per hour. Hopper openings up to 48"x72".



IMPACT HAMMER MILL with RECYCLING BREAKER PLATE

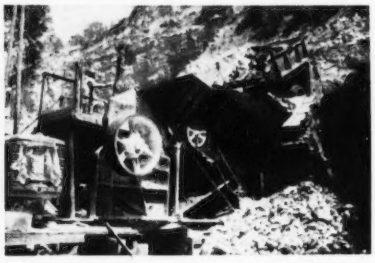
Rugged simple adjustments for low grade Iron, Ores, Bauxite, Phosphate muck and wet, damp, sticky materials.



FOUR GRUENDLER HAMMER MILLS

On the production line in our plant for shipment to one large Company. Here is a combined potential capacity of 500,000 Tons per year, — 10 mesh minus.

ILLUSTRATED BULLETINS, SPECIFICATIONS and OUR PLANT DESIGN RECOMMENDATIONS on written request.



GRUENDLER OVERHEAD ECCENTRIC ROLLER BEARING JAW CRUSHER

With exclusive Hydraulic Shim Jack. Sizes range from 10x16 to 30x42 Manganese pan type FEEDERS from 24 to 60 inches wide, overlapping trouble free flights. Many Gruendler Feeders have handled over million tons without replacement of pans.

GRUENDLER

CRUSHER & PULVERIZER COMPANY

PLANT AND EXECUTIVE OFFICES: 2915-25 NORTH MARKET, ST. LOUIS 6, MO.

HERE'S WHAT REPUBLIC DISTRIBUTORS DO FOR YOU–

TOWER SUCTION

Smooth bore construction with mechanical reinforcing wire within the wall of hose. Used principally for gritty, sandy, corrosive fluids.

TOWER SUCTION

Rough bore construction has exposed lining of wire and fabric. Good for heavy service but not recommended for water containing grit or fluids having corrosive properties.

Illustration shows operator anchoring built-in nipples.

Mr. Ray L. Smith, President
Troy Belting & Supply Co.
Troy, New York

How to Select Suction Hose for Your Job

● Since long service life has an important bearing on costs far beyond the purchase price of suction hose, consult an experienced Republic distributor.

Tower is the best all-purpose suction hose that Republic has built in nearly a half century of manufacturing. Republic also makes other high quality brands for special requirements. To select the type of hose which will save you money on the job, it will be well worth your while to consult a Republic Distributor such as Mr. Ray Smith. If you don't find the Republic distributor's name in the classified section of your telephone directory, write or mail the coupon and we will send you his name.

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN, OHIO
Lee Deluxe Tires & Tubes · · Conshohocken, Pa.

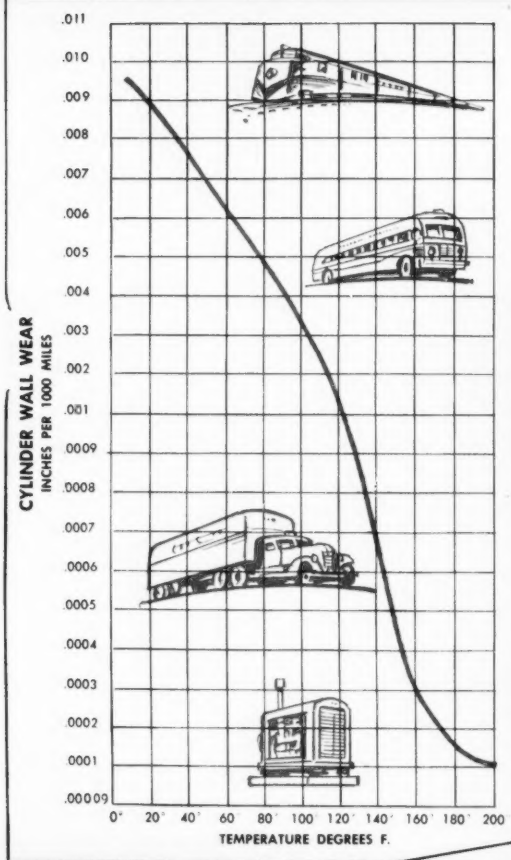
Pioneers in the use of COLD RUBBER

MECHANICAL RUBBER GOODS BY
REPUBLIC RUBBER DIVISION

WHO REPRESENTS REPUBLIC IN MY AREA?
REPUBLIC RUBBER DIVISION · LEE RUBBER & TIRE CORP.
YOUNGSTOWN, OHIO

Name, title_____
Firm_____
Address_____
City_____ State_____

The HIGHER THE TEMPERATURE . . . the LESS WEAR on the Cylinder Wall!

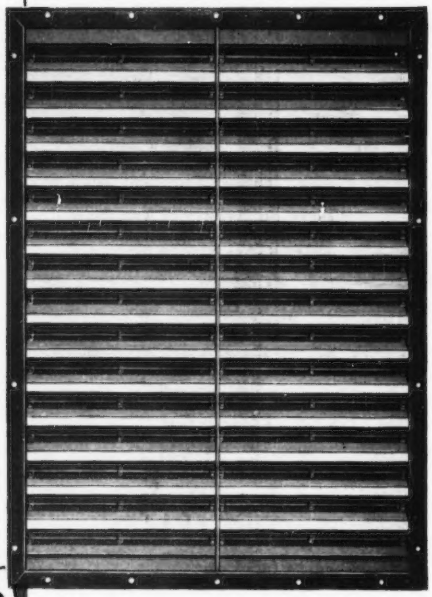


STUDY THIS SAE CHART

As is commonly known, the higher the temperature, the less amount of wear on the cylinder wall. Uniform high heat is also beneficial to an engine otherwise, adding power, economy and longer life, and preventing sludge!

KYSOR SHUTTERS

Control Temperature!



8%-12% MORE FUEL SAVING

Less Oil Consumption

Fewer Breakdowns

Kysor Shutters are TEMPERATURE CONTROLLED—maintaining the proper temperature at all times by means of automatic air or vacuum controls. They afford positive protection within 8 or 10 degrees! Install a Kysor shutter on that new or old engine, or specify it from your manufacturer. *It will soon pay for itself in recognizable greater efficiency.*

Write for bulletin!

"Built to Last"

KYSOR HEATER COMPANY Cadillac, Michigan

CANADIAN REPRESENTATIVES... RAILWAY & POWER ENGINEERING CORP.

NEW GLASGOW · MONTREAL · NORANDA · NORTH BAY · TORONTO · HAMILTON · WINDSOR · WINNIPEG · EDMONTON · VANCOUVER

BIG NEWS!

A new booklet gives you

"Facts you should know about

HARDFACING ALLOYS"

Send for your free copy, TODAY!

This NEW, FREE booklet by Airco gives you authentic, understandable information for combating wear — caused by abrasion, impact, heat and corrosion.

Here, you will get facts essential for increasing the service life of *new* parts, and restoring *worn* parts for additional service. In part, this definitive, profusely illustrated booklet gives you:

- A handy, easy-to-understand guide for selecting the proper alloy for the proper wear retarding job.
- A Hardness Conversion Table.
- A Preheating Chart.
- A FULL description, and explanation, of Airco's NEW line of Hardfacing Alloys, with specification data, application technique, deposit hardness, color markings and deposit analysis.

If you are interested in increasing the service life of your equipment from 2 to 25 times, fill in and mail the coupon below for a copy of this NEW booklet. Send it to our nearest office or authorized dealer. On West Coast: Air Reduction Pacific Company. Represented Internationally by Airco Corporation (International).

ALSO — FOR ONLY $2.95 — YOU CAN GET A TRIAL ASSORTMENT OF AIRCO'S NEW LINE OF HARDFACING ALLOYS . . . A SPECIAL OFFER, AVAILABLE FOR A LIMITED TIME ONLY.

MAIL THIS COUPON TODAY FOR YOUR FREE COPY OF AIRCO'S DEFINITIVE HARDFACING BOOKLET

IA

Air Reduction, 60 East 42nd Street, New York 17, N. Y.

☐ Send me a copy of Airco's New Hardfacing booklet — at NO cost to me.

☐ Here is my check for $2.95 — send me the special package of Airco's Hardfacing Alloys.

Firm_____

Signed By_____

Address_____

City & State_____

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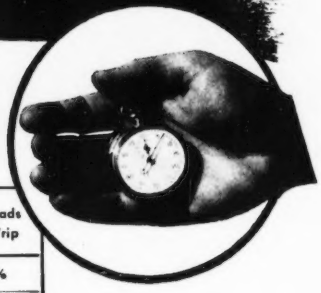
Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

WE CAN INCREASE YOUR YARDAGE 50 TO 100%

It's a Guarantee

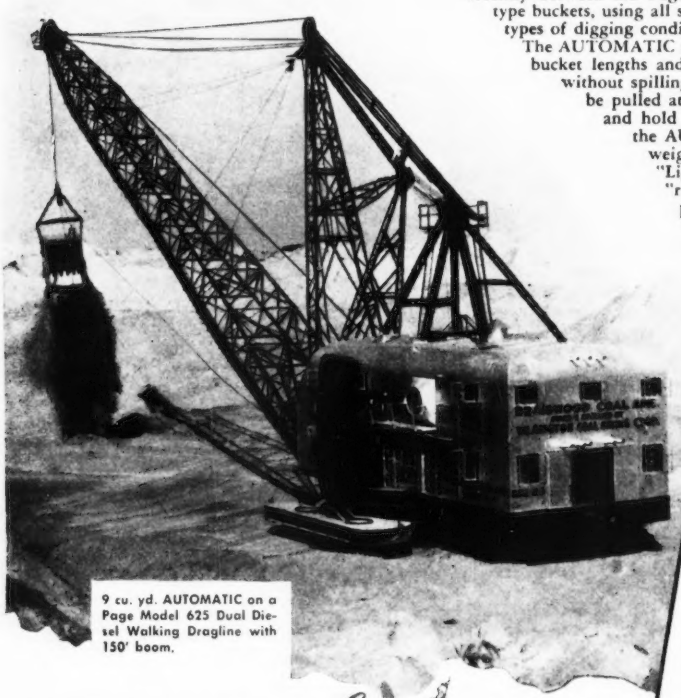


Type of Bucket	Load Time	Dump Time	Jockeying Time	Total Time	Full Loads Each Trip
AUTOMATIC	3 to 7 sec.	2 to 4 sec.	0 sec.	5 to 11 sec.	100%
Ordinary Type	7 to 16 sec.	4 to 7 sec.	2 to 6 sec.	13 to 29 sec.	85%

THESE are the facts proven by numerous tests made recently between the Page AUTOMATIC and ordinary type buckets, using all sizes from ⅜ to 30 cu. yd. in various types of digging conditions.

The AUTOMATIC always gets a full load within 1 to 2 bucket lengths and can be picked up immediately without spilling while ordinary buckets have to be pulled at least 4 to 6 bucket lengths to get and hold their loads. Another point about the AUTOMATIC—it is always the correct weight for maximum digging efficiency. "Light-weight" buckets of larger "rated" capacity cannot match the profit-making ability of a Page.

For more yardage per day, lower power costs and minimum maintenance, be sure your next dragline bucket is a Page AUTOMATIC.



9 cu. yd. AUTOMATIC on a Page Model 625 Dual Diesel Walking Dragline with 150' boom.

GET THE FACTS TODAY

Call or write for details on how to make a time study with your own stop-watch for positive proof—or better still, ask for a Page engineer to call and prove these facts without any obligation.

25 to 45% less power required for day-after-day operation because the AUTOMATIC loads, dumps and handles faster.

Less maintenance because the AUTOMATIC is not worn out through excessive dragging to get its load.

The AUTOMATIC always lands in digging position, digs in at first pull on the load line and never produces windrows.

Send for Bulletin 2049

PAGE *Automatic*

DRAGLINE BUCKETS *and* WALKING DRAGLINES

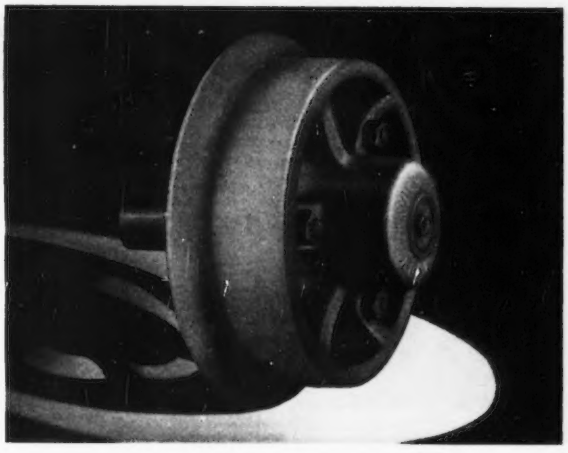
PAGE ENGINEERING COMPANY

Clearing Post Office • Chicago 38, Illinois

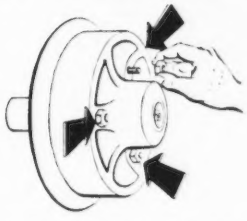
you get top performance..

Less Maintenance

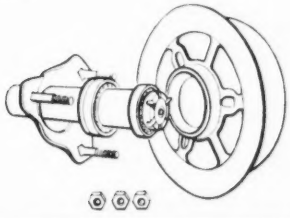
...with S-D "FLOATERS"!



QUICK DEMOUNTABILITY SAVES HOURS OF MAINTENANCE TIME



Shown by arrows above are the three nuts that hold the S-D "Floater" in position. To demount the "Floater" remove the three nuts and the wheel slips off (as shown below). Bearings are held in perfect adjustment on the axle by the retaining nut on the end of the axle.



The S-D "Floater" is one mine car wheel that gives you top performance in the mine at rock bottom maintenance cost. Smooth-rolling S-D "Floaters" are stacking up performance records all over the country. According to independent engineering tests, they have, in some instances, increased the net loads hauled by locomotives as much as 50% over other types of precision bearings—a tremendous saving in power. When it is necessary to demount a wheel, an unskilled worker can do the job as quick and easy as removing an automobile wheel, saving hours and dollars in maintenance. In addition, the "Floater" solid front hub and double back seal eliminates grease leakage . . . one greasing in five years is usually sufficient . . . this is lubrication cost at its lowest point. The "Floater" principle of one set of bearings which "float" into perfect adjustment eliminates pinching, mis-alignment, loose or tight bearings. That's why we guarantee "Floaters" against bearing failure for five years. Write today for folder 7105.

20 Car loads of "Automatics" from—

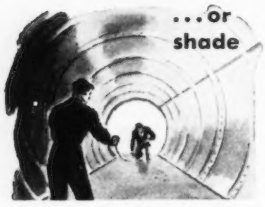
SANFORD-DAY IRON WORKS, Inc. Knoxville 9, Tenn.

LUFKIN

CHROME CLAD STEEL TAPES

Easy to Read

in sun . . .



. . . or shade

Special non-glare satin finish on heavy chrome plating that adds to toughness of the line. Durable jet-black markings stand out sharply against this light-absorbing surface. Will not crack, chip or peel.

Rust and Corrosion Resistant

in tropical damp . . .

. . . or chemical fumes

A rust-resistant coating plus *multiple* coats of electroplating give remarkable protection against rust and corrosion under conditions no other tapes can withstand.

Wear Protected Against Dragging

on concrete . . .

. . . or gravel

Markings are bonded to the steel base, and are sunk *below* the chrome surface to protect against wear. No metal is etched away. Hardened steel tape—tough—flexible—kink-resistant—protects against line breakage.

DIAGRAMMATIC CROSS-SECTION VIEW

1. Hardened Steel Tape. 2. Rust-Resistant Coating. 3. Multiple Coats of Electroplating. 4. Hard, Smooth, Non-Glare Chrome-Plating. 5. Black Markings Bonded to Steel, Sunk below Surface.

The instant you pick up a Lufkin Chrome Clad Steel Tape, your hands and eyes will approve it. You will like the satin-smooth flexible "feel"—the precision-made appearance—the easy-on-the-eyes finish and markings.

But only usage—the rougher the better—will prove how and why Chrome Clad Steel Tapes actually *do* what no other tapes *can* do.

Use them in extremes of noon-day sun or tunnel shade and you'll be surprised how plainly the markings stand out—with less stooping, squinting and eye strain.

On gruelling construction work, you'll find kinking and line breakage rare indeed and the markings still sharp after years of usage.

Or test them in mines, oil fields, chemical plants or sea water and their amazing rust and corrosion resistance will delight you.

Call for Lufkin Chrome Clad Steel Tapes at your dealers and prove these statements for yourself.

***Buy* steel tapes with easy-to-read markings that are durable**

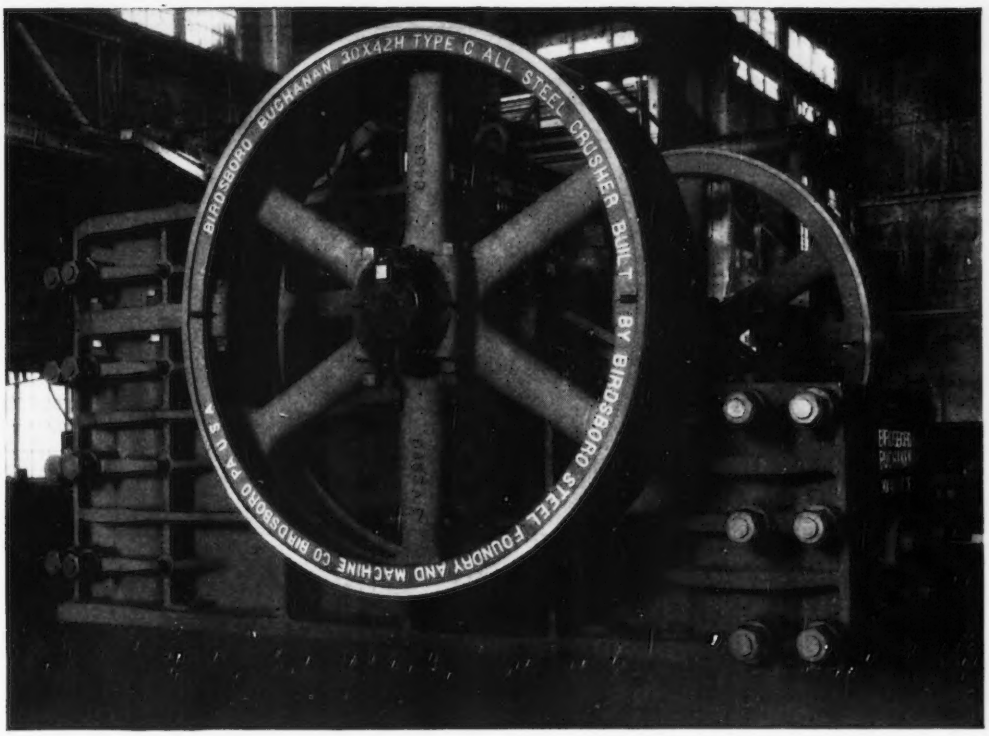
"RANGER" Model . . . Lufkin's Chrome Clad tape specially designed for engineers. The sturdy steel line—only ¼" wide to reduce wind resistance and provide compactness—is readily detachable from case. Permanent jet black markings are available in either feet, inches and eighths or feet, tenths and hundredths. Zero falls at end of line. Rust resistant steel liner protected by hand stitched leather case.

***Buy* LUFKIN**

PRECISION TOOLS • TAPES • RULES
FROM YOUR DISTRIBUTOR

THE LUFKIN RULE CO.

Saginaw, Michigan • New York City • Windsor, Canada



Keep up with the latest crusher developments . . . Send for this Type C Crusher Catalog on your company letterhead without delay . . . And if you have a special crushing problem, call in a Birdsboro engineer.

BIRDSBORO-BUCHANAN CRUSHERS

Built to Cut CRUSHING COSTS

with Dependable, Trouble-Free Operation

Birdsboro-Buchanan Crushers, in day-in and day-out service on hundreds of mining and quarrying operations, have proved their efficiency in the fast reduction of all types of rock and ore while providing substantial power savings and reducing maintenance costs.

These units are simple in design and ruggedly built with deep, strong all cast steel frames—and jaw openings from 24" x 36" to 66" x 84" to handle all primary crushing assignments.

BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY - BIRDSBORO, PA.

DESIGNERS AND BUILDERS OF:
Crushing Machinery - Rolls - Steel Mill Equipment - Hydraulic Presses - Special Machinery - Steel Castings

World Wide Agent Representation
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TORONTO, CANADA

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BUCHANAN JAW CRUSHERS

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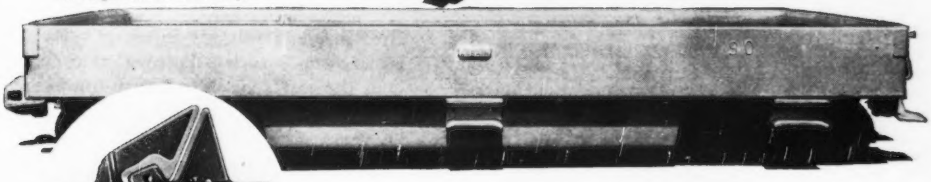

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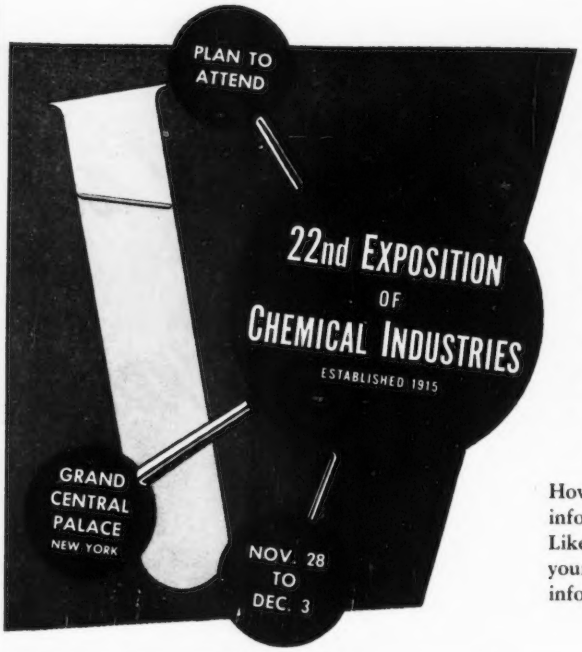

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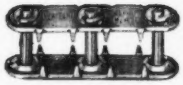

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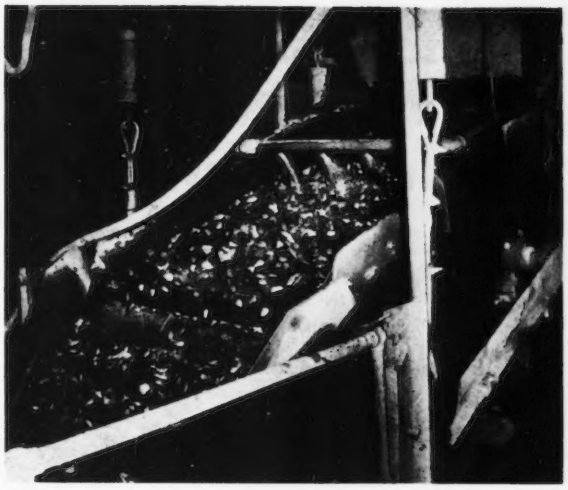

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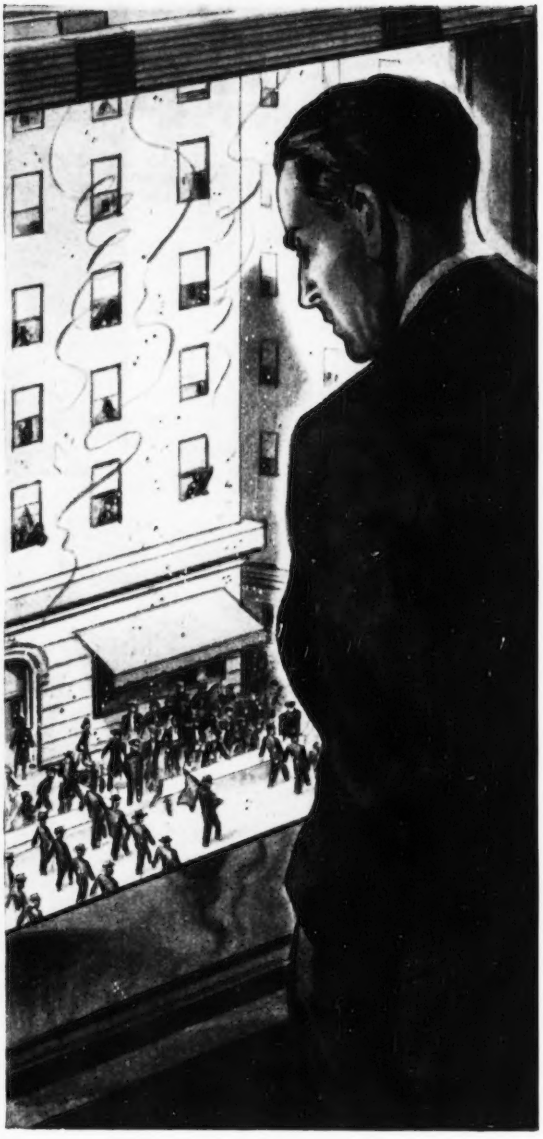

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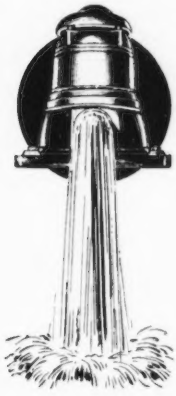

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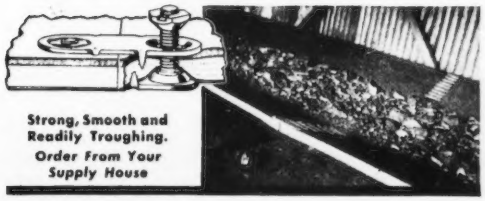

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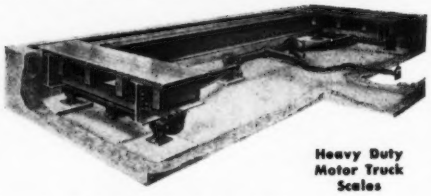

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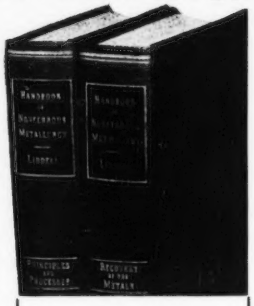

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Operating West Coast South America, has opening for Sales Engineer familiar with mining and milling machinery. General sales and service. Preferably graduate engineer with sales ability. Advise age, marital status, experience. Spanish advantageous but not essential. Reply BO-9091, Engineering & Mining Jl.

Partner Wanted

to finance extremely rich gold-lead-copper mine in Arizona. Is developed mine with production record of over one million dollars. Is adjoined and surrounded by old rich producers. Finance needed to equip mine and complete tunnel to highgrade vein which will give 500 feet of backs and 1500 feet in length. 2 to 5 feet wide. Fine report by eminent engineer. Mine run ore averages high as $57.65 per ton in gold and lead. Liberal interest given for nominal amount. Will stand rigid investigation. BO 9796, Engineering & Mining Jl.

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Have 30 years' experience in placer mining and $80,000 in new placer washing plant. Have large proven placer deposit Arizona. Want partner with $50,000 for operation and exploration. 11,000 yards sampled, produced $8,000 in gold. Handle your own money.

Owner, Darrell V. Cole,
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Large engineering firm wishes to acquire several complete plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. *Box 1231, 1474 Broadway, New York 18, N. Y.*

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Million tons uncovered during last war. Black Sand—contains gold, platinum. Ruby Zircon Sapphire and from 4% to 20% chrome loose, bulk. Zone approx. 500 ft. wide, 10 to 50 ft. thick, 1,000 to 2,000 ft. long. Easily concentrated with Humphreys Spirals; excellent deal for right operator—on shoreline opposite Marshfield, Oregon. Perhaps largest developed tonnage in U. S. A. Address Dr. Muchow, U. S. Chromium, Inc., 228 So. Wabash, Chicago 4.

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Sinking, drifting, raising, stoping, core drilling and grouting by contract or bonus system.
Your equipment or mine.
Fast—Dependable—Economical
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Textolite lightweight laminated plastic pipe manufactured for the Government by General Electric Co. and now surplus. Unused. Resists the effects of corrosive waters and atmospheres, chemical salts and solutions, solvents, gasolines, etc. A high pressure pipe, 3" O.D., with ¼" wall. Offered threaded and complete with pipe type couplings of like material. Lower cost than iron pipe with additional savings from easy handling. Ideal as mine piping. Specifications and technical data, with a sample of material free on request. This material will stand the most rigid technical examination.

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1—Pair Allis-Chalmers 40" x 15" Anaconda Crushing Rolls. Completely rebuilt and rebabbitted.

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1 No. 33 I.R. Drill Sharpener with bit punch attachment, reconditioned at $550.00.

15 Ton NEW 1" and ⅞" ROUND HOLLOW DRILL STEEL mill length.

7 Ton SOLID DRILL STEEL, 1¼" hex and 1" quarter octagon.

BLASTING BATTERIES—100-30 hole wood case push down rack bar type—also 250-10 cap, all metal cases, twist key type.

100,000 ft. Firing wire, two conductor, twisted, black cover, 500 ft. coils.

Priced 1/3 below manufacturer's present prices.

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All Sizes
Track Accessories
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FOR SALE

2—New #78 Wemco SH Spiral Classifiers, 78" spiral diameter, 32 ft. tank length, as described in Western Machinery Company's bulletin number C-1-S-1. Self supporting tank, single pitch. Motorized hydraulic lifting device. 10 H.P. BBTEFC, 3 phase, 60 cycle, 220/440 V. motor. V belts and cone type gear reducer. Spiral operates at 7 R.P.M. Suitable for classifier or sand and gravel washer. Write

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AMERICAN CYANAMID COMPANY
PINEY RIVER, VIRGINIA

DIESEL POWER PLANT

1—200 KW, 400 RPM Buckeye
1—100 KW, 400 RPM Buckeye
Complete with switch gear and all accessories. GM 2-71 Power Units for shovels, gravel plants, etc. Attractive prices. Immediate delivery.

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Sludges bought outright or recovery processes developed under contract.

LOCOMOTIVES WANTED

If you have a Mancha locomotive for sale, mail description, serial number and price.

W9193 Engineering and Mining Journal
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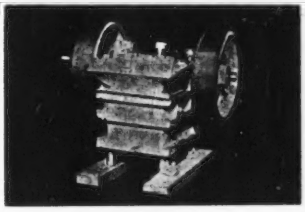
2—2" Wilfley Sand Pumps.
1—3" Sackett Sand Pump.
1—3" x 3" Allen-Sherman-Hoff rubber lined Hydro-seal pump.
1—4" Traylor centrifugal sand pump.
1—4" Allen-Sherman-Hoff Hydro-seal pump.
1—4" Dorrco simplex diaphragm pump.
2—4" Butcher diaphragm pumps.
1—400 GPM Pomona deepwell pump, motor driven.
2—6" Manistee 8-stage centrifugal pumps, driven by 400 HP G.E. motors.
2—5" Byron Jackson portable pumps driven by Buda gas engines, trailer mounted on two pneumatic tires.
1—12"x12" Buffalo wet vacuum pump.
1—18"x12" Worthington duplex dry vacuum pump.
2—4"x4"x2¾" Ingersoll-Rand vacuum pumps.
1—7¼"x4" C. I. W. vacuum pump.
30—1½" new Deming centrifugal pumps driven by 1½ HP G.E. motors mounted on Reeves adjustable bases.
5—1" new Ingersoll-Rand motor pumps.
1—2" Duriron self priming acid resistant pump.
2—3" Worthington centrifugal pumps.

CLASSIFIERS

1—36"x20' Dorr Duplex Rake Classifier.
1—54"x16' Morse "Trueline" Rake Classifier.
1—8' bowl attachment from Dorr 22" simplex Classifier.
3—"St. Joe" type Hydraulic Classifiers, 10 cells, 20 spigots.



JAW CRUSHERS

1—8"x8" Universal Semi-Steel Crusher.
1—8"x24" Rogers Cast Steel Crusher.
1—9"x15" Farrell Blake type.
1—9"x16" Cedar Rapids All-Steel Crusher.
1—9"x16" New Morse Crusher.
1—8"x36" Universal All-Steel Crusher.
1—9"x36" Cedar Rapids.
1—15"x20" Universal All-Steel Crusher.
1—10"x24" Allis-Chalmers Jaw Crusher.
1—24"x36" Traylor "Type A."

CRUSHING ROLLS

1—10"x24" New Walker Crushing Roll.
1—27"x14" McFarlane Crushing Roll.

FILTERS

1—3'x4' Oliver Drum Filter.
2—6'x2 disc American continuous Disc Filter.
1—6'x3 disc American continuous Disc Filter.

LOCOMOTIVES

2—2 to 2½-Ton Mancha Battery, 18" gauge.
1—2 to 2½-Ton Whitcomb Battery, 24" ga.
2—7-Ton General Electric Permissible Type Battery Locomotive, 36" gauge.
1—7-Ton Mancha Battery, 36" gauge.
2—8-Ton General Electric Battery Locomotives, 36" gauge.
4—10-Ton Atlas Battery Locomotives, 36" ga.
3—6½-Ton General Electric Trolley Locomotives, 36" gauge.
1—5"x16" Porter Compressed Air Locomotive, 18" gauge.
1—5½"x16" Baldwin Compressed Air Locomotive, 20" gauge.
1—8-Ton Whitcomb Gas Driven, 24" gauge.
2—18-Ton Davenport Steam Locomotives, 1—36" gauge, 1—standard gauge.
1—3-Ton Ruth Gasoline Driven, 18" gauge.

BALL AND ROD MILLS

1—36"x24" New Morse Bros. Batch Mill.
1—4'x4' New Ball Mill.
2—6'x36" Hardinge Conical Ball Mills.
1—6'x48" Hardinge Conical Ball Mill.
1—6'x8' Marcy Ball Mill.
1—8'x22" Hardinge Conical Pebble Mill.
1—3'x8' Denver Engineering Works Tube Mill.
1—3'x9' Ruth Rod Mill.
1—5'x36" Hardinge Conical Ball Mill.

BALL MILLS

1—64½ Marcy Ball Mill.

MISCELLANEOUS EQUIPMENT

18—5 turn 2" Humphrey spirals.
1—D8800 Caterpillar diesel engine.
1—3'x8' new dillon Denver mechanical vibrating screen.
1—Morse-Weinig 8-cell flotation machine.
6—#6 Willfley concentrating tables.

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1—350 H.P., single drum, 88" dia., 60" face.
1—250 H.P., single drum, 72" x5', 30,000 lbs. single line pull, 750 FPM, complete.
1—200 H.P., single drum, 42" face, 60" dia., A.C., 2200 volts and controls.
1—150 H.P., double drum, 38" dia., 42" face, 440 volts, A.C., complete with controls.

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SHOVELS AND DRAGLINES: Diesel and Electric, 1 yd. to 12 yd. capacity.

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SURPLUS MINING EQUIPMENT

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1—8 Cell Denver, #18 Special, left hand, 32"x32".
1—10 Cell Denver, #18, Serial #C-1200, steel tank.
1—65' Butchart Thickener, Spiral rakes, Fir tank.
1—Butchart concentrating table, left hand.

MINING MACHINERY

1—Webb City, 20 Ton truck scales.
1—150 HP Pomona pump, 11 stage, 350'-8" column and rods.
4—#12-B Eimco shovels, 24" track gauge.
1—Sullivan shovel, 22" track gauge.
2—Freeman Mine Hoists.
1—3 Drum IR slusher, 25 HP, 440 volts, 60 cyc.
3—DA-35 IR Automatic feed rock drills.
1—C.P. 17"x10"x12", Compressor.
2—#25 IR Sump pumps.

MILLING MACHINERY

1—18"x30" Rogers jaw crusher.
1—51" Rogers Rolls.
1—42" Rogers Rolls.
2—4'x8' Trommel screens.
1—24"x147' Belt conveyor, idlers, head and tail pulleys.
5—#1, 2, and 3 American speed reducers.
1—#8 Cameron centrifugal pump, 2000 gpm, 40' head.

ELECTRICAL EQUIPMENT, 60 CYC.

1—150 HP Sync. motor, 720 RPM, 2000 volts.
2—125 HP Slip ring motors, 385 RPM, 2200 volts.
1—100 HP Induction motor, 695 RPM, 2200 volts.
1—100 KVA Wagner Trans., Single Ph., 2200-240/480.
1—75 HP Slip ring motor, 440 volt, 700 RPM.

Other motors 2-3-5-10 and 50 HP.

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25,000 ft. #4-2/c round 133-strand flexible Neoprene Jacketed 600-Volt cable on 1000-ft. reels. 29c-ft., F.O.B. Chicago.

Universal Wire & Cable Co.
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SPECIAL OFFERING

1—New 18 x 32 solid steel frame style D Crusher.
1—Factory rebd.—4x10 plate from Crusher.
1—New 14 x 26 solid steel frame Jaw Crusher.
1—No. 6 McCully Crusher in good running condition, just taken from service.

ACME ROAD MACHINERY CO.
FRANKFORT NEW YORK

FLOTATION MACHINES
3—#24 Denver "Sub-A," 8-cell, wood tank.

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4 6'x16' Deister Type, New Rubber Decks—Motorized.
1—6'x16' Butchart, New Rubber Decks—Motorized.

PUMPS—SAND
6 2" Willfleys—Rubber Lined—Motorized.

BELT CONVEYORS
1 14" 20' centers, new belt, V-belted to 1½ HP Motor.
1 24" 15' centers, motorized.
1 30" 70' centers, motorized.
1 42" 20' centers, motorized.

SLUSHER HOIST
1 Ingersoll-Rand, 3 drum, with built in AC Motor and 1½ yd. Crescent Scrapers.

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3—D 13000 Caterpillar Diesel Engines, direct connected to 75 KW, 440 volt AC Generators.
1 D-4400 Caterpillar Diesel Power Unit, V-belted to 220 volt AC Generator.

BALL MILLS
1—#64 Marcy.
1—6'x7' Allis-Chalmers.

THICKENERS
1—20'x8' Dorr—Fir Tank.
1—20'x8' Booth Thompson—Fir Tank.

CLASSIFIERS
1—60"x23' Denver Simplex Cross-flow Classifier.
1—6'x22' Dorr Type Duplex Classifier.

FILTERS—DISC
1—4', 6-disc, Elmco Filters, with Vac. Equip.

VIBRATING SCREENS
1—3'x6' Flat-O, Single Deck.
1—3'x6' Tyler-Niagara, Single Deck.

MISCELLANEOUS EQUIPMENT
#3 Dorreo Duplex Diaphragm Pump with gear motor.
Hydroseal Rubber-lined Cent. Pumps, 2" to 8".
Ingersoll Rand Motor Mtd. Pumps, 1 HP to 25 HP.
Deep Well Pumps.
Wood Stave Ore Bins.
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Dings Magnetic Pulleys with or without conveyors.
Wagon Drills—Blowers—Motors.
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AIR COMPRESSORS
9 Electric 5000, 3170, 2200, 1528 & 1302 ft.
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150 Dump Cars, 2, 4, 12, 20 & 30 Yd.
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2—74,000 Bbl. Cap. Vert. 114'7" x 40'.
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7—60x84, 40x48, 36x42 & 24x36.
ROTARY DRYERS & KILNS
70" x 35' Indirect Ruggles Coles XB-10.
54" x 40' Louisville Steam Tube.
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Kilns 5 x 50, 7'6" x 125, 8 x 60.
BALL, ROD & TUBE MILLS
6' x 48" Hardinge Conical Ball Mill.
5' x 22" Hardinge Conical Ball Mill.
4x10, 6x6 & 7x5 Cylindrical Ball Mills.
7' x 18' Allis Chalmers 2 Compartment Mill.
6x14 Hardinge Classifier.
36" & 78" Spiral 4' Dorr Rake Classifier.
3x8, 4x10 & 7x9 Rod Mills, Marcy, Hardinge.
5 x 22 Allis Chalmers Tube Mill.
4 x 16 & 5½ x 20 Tube Mills, Steel & Silex Lined.
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#1½ Sturtevant Ring Roll Mill.
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Allis-Chalmers Continuous Steel Lined Ball Mill, 8' dia. x 7' long, complete with balls, drive and 250 HP motor.
Williams #1 Hammer Mill
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STATIONARY and PORTABLE
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4" DISCHARGE HOSE

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USES
Strip Mining; Portable Pipe Lines; Fire Hose; Sewer & Trench Work; Manholes; Discharge on Pumps.

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50-FT. LENGTHS
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8 Vertical bucket Link Belt Elevators, 18' to 60' high-belt type.
11 Belt conveyors, 18" Link Belt, 20 to 60 ft. long.
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1 Link Belt Roll Crusher, 32" dia. x 22".
2 Roll Crushers, 24" x 18".
1 Traylor Jaw Crusher.
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1 Nichols Herreshoff 10 Hearth 21' furnace complete.

All the above used less than 6 months with few exceptions. All have explosion proof 220/440 3/60 motors. Inspection Paterson, New Jersey.

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500' roll of New Goodyear Belt, 36"x6 ply, 3/16" top cover—1/32" pulley cover—32 oz. duck. Bargain for quick sale.

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Niles Geared Head Lathe, 36" swing, 16' between centers.

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New and Rebuilt
ELECTRIC EQUIPMENT CO.
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Marcy ball mill, Humphrey's Spirals, pumps, motors and other surplus mill equipment. Also 800 and 100 KW Diesel generating plants. Inspect at Pacific Bridge Company, Park City, Utah, or contact Pacific Bridge Company, 333 Kearny, San Francisco.

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Ores and chemicals—any raw materials from owners.

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(25 years Mining experience)
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COMPLETE MINING—MILLING—CONCENTRATING PLANTS FOR SALE—ALL OR ANY PART. We have a very complete selection of nearly every item needed for mining, milling, construction. Here is a partial list of equipment available.

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75#, 60#, 52#, 45#, 30# and 20#. Big selection rail.
1", 2", 3", 4", 6", 8" pipe. Large quantities.

STRUCTURAL STEEL

Several complete all steel large buildings, suitable for milling plant. Several hundred tons channels, I beams, columns, angle iron and trusses. Steel ore bins, steel agitator tanks, steel thickener tanks, steel mine lockers.

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2—#75 Marcys with motors.
3—#86 Marcys with motors.
1—#76 Marcy with motor.
2—5'x8' Denver tube mills.
2—5'x13' Denver pebble mills.
1—4x4 C.I.W. ball mill.
1—4½x8 Ball Foundry ball mill.
1—7'x36" Hardinge conical ball mill.

MINE HOISTS

1—Washington Iron Works single drum hoist, 175 HP.
1—Sullivan single drum hoist, 7½ HP.
1—Hendrie Bolthoff single drum hoist, 100 HP.
4—Sullivan double drum tugger hoists, 10 HP.
2—Sullivan double drum tugger hoists, 7½ HP.

MOTORS

Approximately 500 motors, from ½ HP. to 200 HP. available, nearly all sizes and descriptions.

MINE CARS

10—Granby mine cars, 4 ton, 80 cu. ft., side dump, 24" gauge.
50—Sanford Day bottom dump mine cars, 89 cu. ft., 36" gauge.
38—Truax 1½ ton mine cars, 18" gauge.
22—15 cu. ft., 18" gauge.
30—8 ton, 24" gauge, 157 cu. ft.
16—3 ton, 24" gauge, 47 cu. ft.
Man cars, powder cars.

COMPRESSORS

1—Ingersoll-Rand 650 cu. ft., 100 HP. air compressor.
1—Ingersoll-Rand 1000 cu. ft., 150 HP. air compressor.
1—Imperial type 10 I.R. compressor, 75 HP.
1—Single cylinder compressor, 9"x12", 40 HP.
1—Chicago Pneumatic 20" & 12" x 16", 2300 cu. ft. compressor.
1—Ingersoll-Rand 676 cu. ft., 2 stage air compressor.
1—Ingersoll-Rand 488 cu. ft., 2 stage air compressor.
1—Gardner-Denver 100 cu. ft. gas driven, on skids.

TRANSFORMERS

1 KVA to 833 KVA transformers, large range sizes and voltages. Also metering and instrument transformers.

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4—Eimco No. 12, 18" gauge, one 24", reconditioned.
2—Eimco No. 21, 24" or 36" gauge, reconditioned.

DIESEL

1—70 KVA diesel generator set, Caterpillar D13000 engine.

Complete 50 ton Cyanide Mill, priced right. Blowers — Belt Trippers — Classifiers — Electric Cable — Feeders — Filters — Magnets — Samplers — Scrapers — Screens — Mine Rescue Equipment — Blacksmith Machinery — Timber Framers — Ore Bins — Large Motor Drying Oven — Machine Shop Equipment — Office Supplies.

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CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom Covers
48"	8	1/8" — 1/16"
42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
26"	5	1/8" — 1/32"
24"	5	1/8" — 1/32"
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

Inquire For Prices — Mention Size and Lengths

NEW

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices — Mention Size and Lengths.

ENDLESS "V" BELTS

"A" Width All Sizes —
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APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 Pair
¾"	25 "	7.50	1.50 Pair
	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
	50 "	20.00	1.50 Pair

LARGER SIZES ALSO AVAILABLE
All Prices—Net — F.O.B. New York

WATER HOSE

I.D. Size	Length	per Length
¾"	25 feet	$4.25
	50 "	8.00
1"	25 "	6.25
	50 "	12.50
1¼"	25 "	7.50
	35 "	10.50
	40 "	12.00
	50 "	15.00
1½"	25 "	10.00
	35 "	14.00
	50 "	20.00

Each Length with Couplings Attached

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FOR CLASSIFIED GRINDING—DEPENDABILITY AND ECONOMICAL PERFORMANCE

Rod Mills offer several important advantages — low pulp level and small amount of pulp in the mill due to the large diameter discharge opening—a slowly revolving mass of rods grinding in line contact—less wear of grinding media—low power per ton of material ground—maximum working efficiency and accessibility to inside of mill—efficient grinding without making excessive slimes.

Bulletin No. 475-R upon request

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ESTABLISHED 1898

P. O. BOX 1708 • DENVER, COLORADO, U. S. A. • CABLE "MORSE"

Open & Shut.... Quick Savings!

The Canton Automatic Door opens with a click — closes with a click, no slow down or hesitation . . . activated by weight of motor or cars on special rail, springing the door open, and after the train passes, springing the door shut. There is nothing protruding from the walls.

Action and reaction are accomplished from the mechanical track mechanism. Operators can see the money-saving and money-making features of such an automatic door. Trips go through at normal operating speeds with no slow down. The trapper boy formerly required for opening and closing doors is no longer an accident liability. Stopping and starting the trip with expensive delays is no longer necessary. Eliminate these expenses and see how quickly the Canton Automatic Mine Door pays for itself, paying extra dividends year after year.

Mechanical Track Cleaners—Rock Dusters—Automatic Doors—Car Transfers—Cable Splicers and Vulcanizers—Safety Signal Systems. In writing for catalogs, please use street and zone numbers.

AMERICAN MINE DOOR CO.

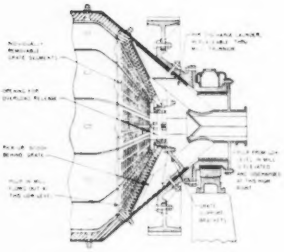
2059 DUEBER AVE. CANTON 6, OHIO

"Grates in Conical Mills? . . . shure!"

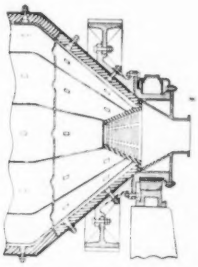
"O' course, *without* a grate in a Conical Mill ye gits ez fast, if not faster, migration thru yer mill that ye gits in reg'lar cylindrical mills *with* grates.

"However, thim Hardinge ingineers *do* specify grates fer Conical Mills in some cases. Fer instance, supposin' yer balls gits forced out durin' surges, 'r if ye want minimum retention time—thin ye need grates.

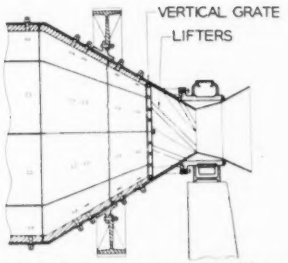
"With grates, ye gits 'super-controlled' product. Fer the latest dope, jist write Hardinge. Ask fer Bulletin AH-389-1 on wet grindin', 'r 17-B-1 on dry grindin'."



High pulp level discharge with reverse cone grate. Permits maximum pulp and ball load.



Deep type cone grate for use when a low pulp level is desired. Scoops elevate the product to discharge spout.



Vertical discharge grate with lifters. Used primarily in dry grinding applications.

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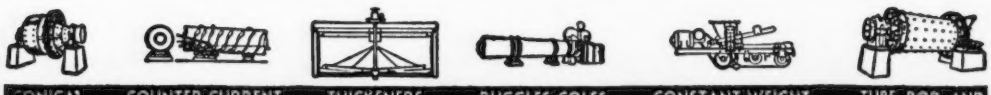
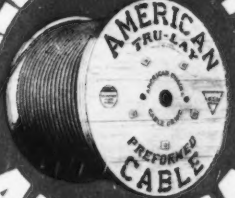


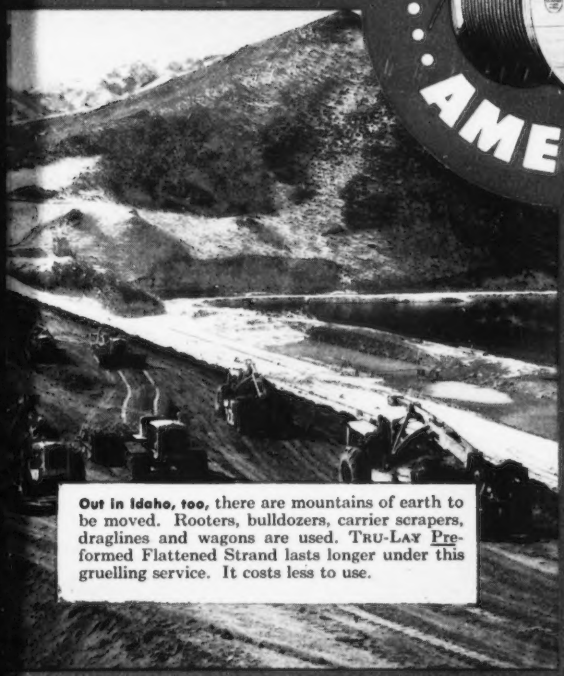
CONICAL MILLS | COUNTER CURRENT CLASSIFIERS | THICKENERS CLARIFIERS | RUGGLES-COLES DRYERS | CONSTANT WEIGHT FEEDERS | TUBE ROD AND BATCH MILLS

In Southern Illinois strip mining is big business. The shovels and draglines that remove overburden are big, too. TRU-LAY Preformed in large sizes has excellent qualities that make it a favorite for strip mining.

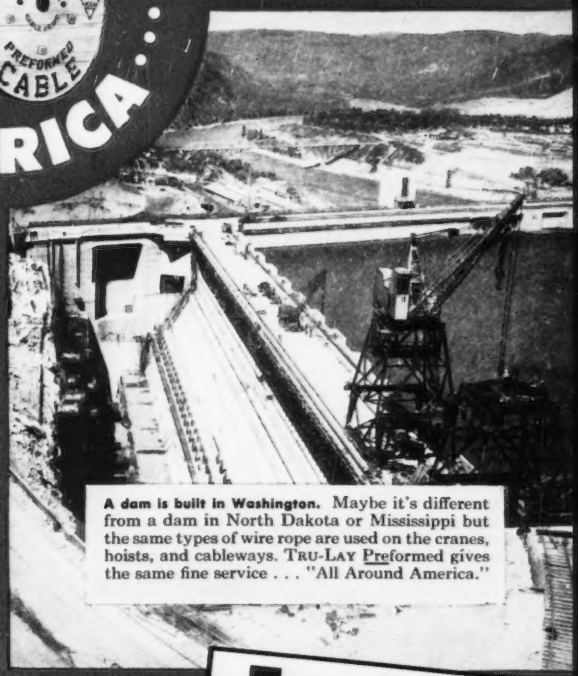
At Detroit a portal crane straddles gondola cars and loads them with foundry sand from storage piles. TRU-LAY Preformed is made in a construction designed for longer service under such abrasive conditions.

ALL AROUND AMERICA





Out in Idaho, too, there are mountains of earth to be moved. Rooters, bulldozers, carrier scrapers, draglines and wagons are used. TRU-LAY Preformed Flattened Strand lasts longer under this gruelling service. It costs less to use.



A dam is built in Washington. Maybe it's different from a dam in North Dakota or Mississippi but the same types of wire rope are used on the cranes, hoists, and cableways. TRU-LAY Preformed gives the same fine service . . . "All Around America."

ACCO

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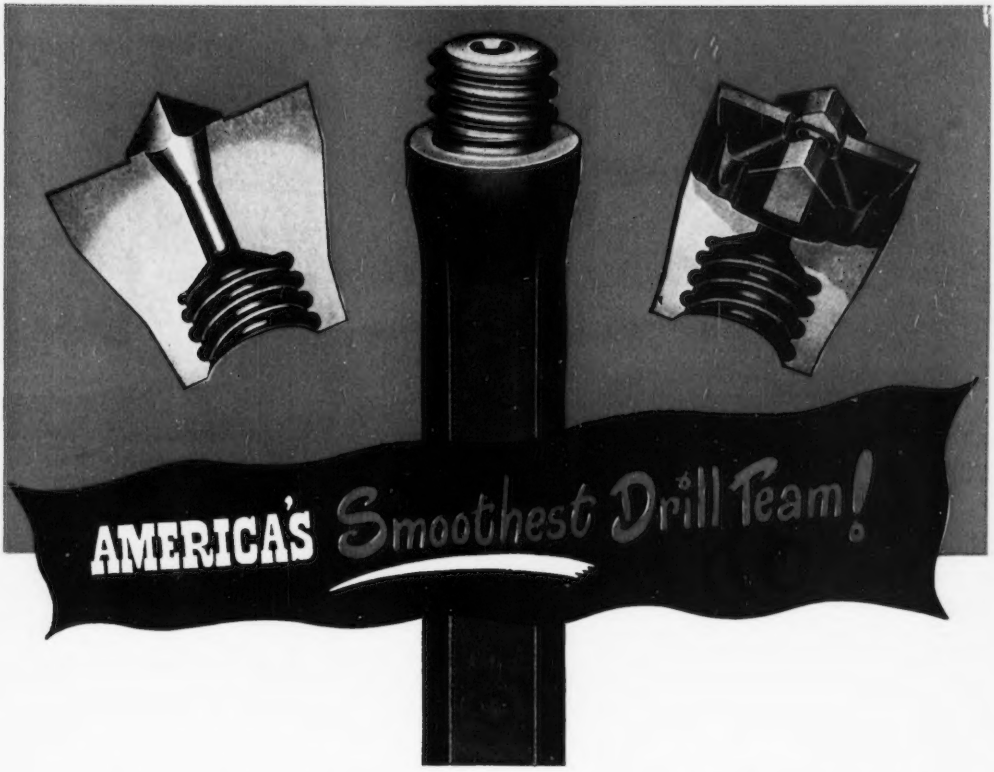
AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

In Business for Your Safety

Tru-Lay *Preformed* **Wire Rope**



You're ready for anything when you put this Timken rock drilling team to work.

With a supply of Timken standard steel bits and Timken carbide insert bits on hand, plus a suitable number of shouldered and threaded steels, you're ready to meet — and beat — any rock condition that may crop up.

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